



**Commonwealth of Kentucky  
Department for Medicaid Services  
Division of Program Quality and Outcomes**

**Focused Study: Emergency Department Visits for Nontraumatic Dental Problems Among the Adult Kentucky Medicaid Managed Care Behavioral Health Subpopulation**

**FINAL REPORT**  
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## Table of Contents

<b>Introduction .....</b>	<b>3</b>
<b>Results .....</b>	<b>4</b>
Demographic and Clinical Characteristics of the Kentucky MMC BH Population .....	4
NTDV: Demographic, Clinical and Access-Related Factors .....	4
Demographic, Clinical and Access-Related Factors by Type of Outpatient Dental Visit .....	10
Risk Factors for Lack of Any Outpatient Dental Visits .....	13
Outpatient Dental Visit Subtypes .....	15
NTDV and Multiple NTDVs by Primary ED Diagnosis .....	16
NTDV Primary Diagnoses by Geographic Area of Residence .....	17
Ten Highest-NTDV-Volume Counties .....	17
Risk Factors for NTDV .....	20
Multiple NTDV: Demographic, Clinical and Access-Related Factors .....	24
Risk Factors for MNTDV .....	26
Comparison of Estimated Costs of Dental Visits .....	28
<b>Discussion .....</b>	<b>29</b>
<b>References .....</b>	<b>33</b>
<b>Appendix A: Outpatient Dental Visit Timing by Visit Type – Ten Counties with the Highest NTDV Rates .....</b>	<b>35</b>

## List of Tables and Figures

Table 1: Demographic Characteristics of the MMC BH Population – Total and by MCO .....	5
Table 2: Six Highest-Volume Chronic Physical Condition Categories Among the Kentucky BH Subpopulation .....	6
Table 3: NTDV Frequencies and Rates – Demographic, Clinical and Access-Related Factors .....	7
Table 4: NTDV Frequencies and Rates – Serious Mental Illness and Substance Use Disorder .....	9
Table 5: Outpatient Dental Visit Type Frequencies and Rates-- Demographic, Clinical and Access-Related Factors .....	11
Table 6: Lack of Any Outpatient Dental Visits: Multiple Logistic Regression Analysis of Risk Factors .....	13
Table 7: Utilization of Outpatient Dental Visits by Outpatient Dental Visit Subtypes. ....	15
Table 8: NTDV and MNTDVs by Primary ED Diagnosis.....	16
Table 9: NTDV Diagnoses Rates by Geographic Area of Residence .....	17
Table 10: State and County NTDV for the Ten Highest-NTDV-Volume Counties in Kentucky .....	18
Table 11: Timing of Outpatient Dental Visits by Visit Type for Members with NTDV(s) – Entire State .....	20
Table 12: NTDV Outcome: Multiple Logistic Regression Analysis of Risk Factors.....	21
Table 13: NTDV Outcome: Multiple Logistic Regression Analysis of Behavioral Health and Substance Use Disorder Diagnoses .....	23
Table 14: MNTDV Frequencies and Rates – Demographic, Clinical and Access-Related Factors.....	24
Table 15: MNTDV Outcome: Multiple Logistic Regression Analysis of Risk Factors .....	26
Figure 1: Comparison of Estimated Costs of Dental Visits. ....	28
Table A1: Timing of Outpatient Dental Visits by Visit Type for Members with NTDV(s) – Ten Counties with the Highest NTDV Rates .....	35

## Introduction

Frequent mouth pain, untreated cavities and unmet dental need are more prevalent among individuals with moderate to severe depression and other behavioral health (BH) conditions relative to unaffected individuals (Malecki et al., 2015). The 2002 Kentucky Adult Oral Health Survey showed that 41.3% of Kentucky adult Medicaid enrollees reported oral pain, and that Medicaid enrollees were disproportionately affected by dental caries relative to privately insured individuals (University of Louisville School of Dentistry, 2003). Geographic barriers restrict access to dentists in Kentucky, as almost one-third of Kentuckians live in Appalachian-designated counties where disproportionately fewer dentists practice (Saman et al., 2010).

Emergency department (ED) visits for dental problems, i.e., nontraumatic dental ED visits (NTDVs), is an indicator of unmet dental need and, thus, barriers to accessing dental care (Davis et al., 2010; Lewis et al., 2015; Sun et al., 2015). Medicaid enrollees were found to have four times the risk for ED visits for nontraumatic dental problems relative to commercially insured individuals (Sun et al., 2015); yet little is known about risk factors for unmet dental need among the subpopulation of Medicaid Managed Care (MMC) enrollees with behavioral health conditions.

## Aim

The aim of this focused study is to quantify the prevalence of and risk factors for nontraumatic dental ED visits (NTDV) among the adult Kentucky MMC BH subpopulation.

## Methodology

Administrative encounter data for measurement year June 1, 2014–May 31, 2015 were utilized to assess relationships between the outcome of an ED visit for nontraumatic dental problems and the risk factors among the adult MMC BH subpopulation (aged 18 years and older, as defined in the Kentucky Behavioral Health Study [IPRO/KDMS, 2014]). The following outcomes were evaluated among the total adult BH subpopulation: any (one or more) ED visit(s) for nontraumatic dental problems (i.e., disorders of tooth development and eruption: International Classification of Diseases 9 (ICD-9) codes 520.0–520.9; diseases of hard tissues of teeth [e.g., caries]: ICD-9 codes 521.0–521.9; disease of pulp and periapical tissues: ICD-9 codes 522.0–522.9; gingival and periodontal diseases: ICD-9 codes 523.0–523.9; other diseases of teeth and supporting structures: ICD-9 codes 525.0–525.9, as defined in Sun et al., 2015). In addition, among the subset of the BH population with NTDV, the outcome of multiple NTDV (MNTDV) was evaluated for associations with risk factors. Risk factors included demographic characteristics (age group, race, sex); BH conditions; chronic physical conditions; member residence (rural non-Appalachian, urban non-Appalachian, and Appalachian county); MCO; access to primary care providers (PCPs) and BH providers for outpatient visits; access to outpatient dental visits by type (restorative: any dental visit type other than exclusively for preventive/diagnostic or pain/palliative care; preventive/diagnostic without restorative care; pain/palliative care without restorative care; and no outpatient dental visits).

## Results

### Demographic and Clinical Characteristics of the Kentucky MMC BH Population

The Kentucky MMC BH population (n = 292,432) is primarily comprised of members of white race/ethnicity (58.28%), females (63.54%), adults of 28–57 years of age (68.06%), and residents of Appalachian (43.44%) and urban counties (40.66%; **Table 1**). Whereas Passport Health Plan members who are urban residents comprise the largest proportion of Passport Health Plan's membership (72.60%) and the largest proportion of urban residents (34.78%), WellCare of Kentucky members who are Appalachian residents comprise the largest proportion of WellCare of Kentucky's membership (59.52%) and the largest proportion of total Appalachian residents (55.50%).

The six highest-volume chronic physical condition categories among the Kentucky MMC BH population were endocrine, nutritional, metabolic and immunity disorders (51.15%); diseases of the circulatory system (48.84%); nervous system and sense organs (43.24%); respiratory system (40.99%); musculoskeletal system (38.88%); and digestive system (33.64%; **Table 2**). The vast majority (83%) had one or more of these chronic physical conditions (**Table 3**).

Of the 292,432 Kentucky MMC BH members, 99,287 (33.95%) had a diagnosis of serious mental illness (SMI) without substance use disorder (SUD); 18,183 (6.22%) had a diagnosis of substance use disorder without SMI; and 15,335 (5.24%) had both a substance use disorder diagnosis and SMI diagnosis (**Table 3**).

### NTDV: Demographic, Clinical and Access-Related Factors

There were 6,536 (2.24%) of 292,432 members with the NTDV outcome (**Table 3**). Demographic factors showed statistically significant differences in proportions (**Table 3**). Adults aged 18–27 years had the highest NTDV rate (3.97%), followed by the second youngest age group aged 28–37 years (3.46%). Non-Appalachian urban residents had the highest NTDV rate (2.70%) of all geographic subgroups. Among the race/ethnicity subgroups, the highest rate for NTDV was among members who did not provide information on their race/ethnicity (2.72%). A greater proportion of males had an NTDV (2.52%) compared to females (2.07%).

Clinical factors also showed statistically significant differences in proportions (**Table 3**). Members with both SMI and SUD had the highest NTDV rate (2.67%) among the SMI and SUD subgroups. Among the chronic physical health conditions subgroups, members without any chronic physical health conditions had the highest NTDV rate (3.46%). As the number of chronic physical conditions increased, the NTDV rate decreased.

Statistically significant differences in proportions were also observed for access-related factors (**Table 3**). Members of Passport Health Plan had the lowest NTDV rate (2.07%). Among the dental outpatient visit subgroups, the highest NTDV rate was observed among members with an outpatient dental visit for pain/palliative care (prior to the NTDV), but without a visit for restorative care (i.e., any dental visit type other than exclusively for preventive/diagnostic or pain/palliative care; also prior to the NTDV; 6.27%). Among the PCP and BH outpatient visit subgroups, the highest NTDV rate was observed among members without visits to either PCPs or BH providers (4.53%).

Table 1: Demographic Characteristics of the MMC BH Population – Total and by MCO

Demographic Characteristic	Total (Row %)(Column %)	Passport Health Plan (Row %)(Column %)	WellCare of Kentucky (Row %)(Column %)	Aetna Better Health of Kentucky (Row %)(Column %)	Humana-CareSource (Row %)(Column %)	Anthem BCBS Medicaid (Row %)(Column %)
Total Kentucky adult MMC BH population	292,432 (100%)	56,960 (19.48%)	118,460 (40.51%)	71,040 (24.29%)	28,531 (9.76%)	17,441 (5.96%)
<b>Race/Ethnicity<sup>a</sup></b>						
White	170,430 (100%) (58.28%)	27,428 (16.09%) (48.15%)	75,129 (44.08%) (63.42%)	44,801 (26.29%) (63.06%)	14,033 (8.23%) (49.19%)	9,039 (5.30%) (51.83%)
Black	17,678 (100%) (6.05%)	7,368 (41.68%) (12.94%)	4,101 (23.20%) (3.46%)	3,503 (19.82%) (4.93%)	2,086 (11.80%) (7.31%)	620 (3.51%) (3.55%)
American Indian or Alaskan Native <sup>b</sup>	279 (100%) (0.10%)	80 (28.67%) (0.14%)	93 (33.33%) (0.08%)	53 (19.00%) (0.07%)	36 (12.90%) (0.13%)	17 (6.09%) (0.10%)
Asian or Pacific Islander <sup>b</sup>	552 (100%) (0.19%)	186 (33.70%) (0.33%)	160 (28.99%) (0.14%)	119 (21.56%) (0.17%)	60 (10.87%) (0.21%)	27 (4.89%) (0.15%)
Hispanic	1 (100%) (0.00%)	1 (100%) (<0.01%)	0	0	0	0
Native Hawaiian <sup>b</sup>	50 (100%) (0.02%)	23 (46.00%) (0.04%)	7 (14.00%) (0.01%)	11 (22.00%) (0.02%)	5 (10.00%) (0.02%)	4 (8.00%) (0.02%)
Other race or ethnicity <sup>c</sup>	34,795 (100%) (11.90%)	7,815 (22.46%) (13.72%)	12,240 (35.18%) (10.33%)	6,447 (18.53%) (9.08%)	4,959 (14.25%) (17.38%)	3,334 (9.58%) (19.12%)
Not provided	68,647 (100%) (23.47%)	14,059 (20.48%) (24.68%)	26,730 (38.94%) (22.56%)	16,106 (23.46%) (22.67%)	7,352 (10.71%) (25.77%)	4,400 (6.41%) (25.23%)
<b>Sex</b>						
Female	185,804 (100%) (63.54%)	36,686 (19.74%) (64.41%)	76,104 (40.96%) (64.24%)	46,645 (25.10%) (65.66%)	16,640 (8.96%) (58.32%)	9,729 (5.24%) (55.78%)
Male	106,628 (100%) (36.46%)	20,274 (19.01%) (35.59%)	42,356 (39.72%) (35.76%)	24,395 (22.88%) (34.34%)	11,891 (11.15%) (41.68%)	7,712 (7.23%) (44.22%)
<b>Age group</b>						
18–27 years	51,528 (100%) (17.62%)	10,759 (20.88%) (18.89%)	19,621 (38.08%) (16.56%)	13,271 (25.75%) (18.68%)	4,844 (9.40%) (16.98%)	3,033 (5.89%) (17.39%)
28–37 years	71,512 (100%) (24.45%)	14,454 (20.21%) (25.38%)	27,848 (38.94%) (23.51%)	17,268 (24.15%) (24.31%)	7,352 (10.28%) (25.77%)	4,590 (6.42%) (26.32%)
38–47 years	62,632 (100%) (21.42%)	12,173 (19.44%) (21.37%)	25,749 (41.11%) (21.74%)	14,292 (22.82%) (20.12%)	6,411 (10.24%) (22.47%)	4,007 (6.40%) (22.97%)
48–57 years	64,901 (100%) (22.19%)	12,356 (19.04%) (21.69%)	27,034 (41.65%) (22.82%)	14,343 (22.10%) (20.19%)	6,917 (10.66%) (24.24%)	4,251 (6.55%) (24.37%)
58+ years	41,859	7,218	18,208	11,866	3,007	1,560

Demographic Characteristic	Total (Row %)(Column %)	Passport Health Plan (Row %)(Column %)	WellCare of Kentucky (Row %)(Column %)	Aetna Better Health of Kentucky (Row %)(Column %)	Humana-CareSource (Row %)(Column %)	Anthem BCBS Medicaid (Row %)(Column %)
	(100%) (14.31%)	(17.24%) (12.67%)	(43.50%) (15.37%)	(28.35%) (16.70%)	(7.18%) (10.54%)	(3.73%) (8.94%)
<b>Geographic area of residence</b>						
Appalachian county	127,038 (100%) (43.44%)	7,906 (6.22%) (13.88%)	70,507 (55.50%) (59.52%)	31,556 (24.84%) (44.42%)	9,121 (7.18%) (31.97%)	7,948 (6.26%) (45.57%)
Non-Appalachian county – rural	46,494 (100%) (15.90%)	7,700 (16.56%) (13.52%)	16,655 (35.82%) (14.06%)	14,260 (30.67%) (20.07%)	4,454 (9.58%) (15.61%)	3,425 (7.37%) (19.64%)
Non-Appalachian county – urban	118,900 (100%) (40.66%)	41,354 (34.78%) (72.60%)	31,298 (26.32%) (26.42%)	25,224 (21.21%) (35.51%)	14,956 (12.58%) (52.42%)	6,068 (5.10%) (34.79%)

<sup>a</sup> Race/ethnicity categories were abstracted directly from the IPRO data warehouse of claims received from KDMS.

<sup>b</sup> These race/ethnicity categories are grouped together into the aggregate category, “Other – specified,” in subsequent tables.

<sup>c</sup> This race/ethnicity category is indicated as “Other – not specified” in subsequent tables.

BCBS: Blue Cross Blue Shield; MMC: Medicaid Managed Care; BH: behavioral health; MCO: managed care organization.

**Table 2: Six Highest-Volume Chronic Physical Condition Categories Among the Kentucky BH Subpopulation**

Chronic Physical Condition Category <sup>a,b</sup>	# Members with Chronic Condition	% of the Total BH Subpopulation
Endocrine, nutritional, metabolic, immunity disorders	149,583	51.15%
Diseases of the circulatory system	142,822	48.84%
Diseases of the nervous system and sense organs	126,436	43.24%
Diseases of the respiratory system	119,877	40.99%
Diseases of the musculoskeletal system	113,709	38.88%
Diseases of the digestive system	98,368	33.64%

<sup>a</sup> Chronic conditions were categorized based on the ICD-9 code designations in the Healthcare Cost and Utilization Project (HCUP) Chronic Condition Indicator File (AHRQ, 2014).

<sup>b</sup> n = 292,432.

BH: behavioral health.

Table 3: NTDV Frequencies and Rates – Demographic, Clinical and Access-Related Factors

Categories	Total BH Population # (Population Proportion)	NTDV <sup>a</sup> # (NTDV Rate)
Total	292,432 (100%)	6,536 (2.24%)
<b>Demographic factors:</b>		
Race <sup>b</sup>		
White	170,430 (58.28%)	3,410 (2.00%)
Black	17,678 (6.05%)	345 (1.95%)
Other – specified <sup>c</sup>	882 (0.30%)	10 (1.13%)
Other – not specified	34,795 (11.90%)	901 (2.59%)
Not reported	68,647 (23.47%)	1,870 (2.72%)
Sex <sup>b</sup>		
Female	185,804 (63.54%)	3,852 (2.07%)
Male	106,628 (36.46%)	2,684 (2.52%)
Age group <sup>b</sup>		
18–27 years	51,528 (17.62%)	2,048 (3.97%)
28–37 years	71,512 (24.45%)	2,477 (3.46%)
38–47 years	62,632 (21.42%)	1,241 (1.98%)
48–57 years	64,901 (22.19%)	651 (1.00%)
58+ years	41,859 (14.31%)	119 (0.28%)
Geographic area of residence <sup>b</sup>		
Appalachian county	127,038 (43.44%)	2,211 (1.74%)
Non-Appalachian county – rural	46,494 (15.90%)	1,119 (2.41%)
Non-Appalachian county – urban	118,900 (40.66%)	3,206 (2.70%)
<b>Clinical factors:</b>		
Physical health – members with high-volume chronic physical conditions <sup>b,d</sup>		
0 conditions	50,610 (17.31%)	1,749 (3.46%)
1 condition	48,701 (16.65%)	1,488 (3.06%)
2 conditions	48,787 (16.68%)	1,128 (2.31%)
3–4 conditions	90,064 (30.80%)	1,505 (1.67%)
5–6 conditions	54,270 (18.56%)	666 (1.23%)
Behavioral health – serious mental illness (SMI) and/or substance use disorder (SUD) <sup>b,e</sup>		
Neither	159,627 (54.59%)	3,824 (2.40%)
SMI, only	99,287 (33.95%)	1,847 (1.86%)
SUD, only	18,183 (6.22%)	456 (2.51%)
Both SMI and SUD	15,335 (5.24%)	409 (2.67%)
<b>Access-related factors:</b>		
MCO <sup>b</sup>		
Passport Health Plan	56,960 (19.48%)	1,178 (2.07%)
WellCare of Kentucky	118,460 (40.51%)	2,576 (2.17%)
Aetna Better Health of Kentucky	71,040 (24.29%)	1,571 (2.21%)
Humana-CareSource	28,531 (9.76%)	685 (2.40%)
Anthem BCBS Medicaid	17,441 (5.96%)	526 (3.02%)
Any outpatient dental visits <sup>b,f</sup>		
Restorative care <sup>g</sup>	67,068 (22.93%)	1,343 (2.00%)
Pain/Palliative care without restorative care, only <sup>g</sup>	3,349 (1.15%)	210 (6.27%)
Preventive/Diagnostic care, only	19,444 (6.65%)	670 (3.45%)
None	202,571 (69.27%)	4,313 (2.13%)

Categories	Total BH Population # (Population Proportion)	NTDV <sup>a</sup> # (NTDV Rate)
Any visits to primary care providers (PCPs) and/or behavioral health (BH) providers <sup>b</sup>		
Both PCP and BH providers	206,978 (70.78%)	3,927 (1.90%)
PCP visits, only	46,670 (15.96%)	997 (2.14%)
BH provider visits, only	6,956 (2.38%)	169 (2.43%)
Neither	31,828 (10.88%)	1,443 (4.53%)

<sup>a</sup> Members included were those with any (one or more) nontraumatic dental ED visit (NTDV).

<sup>b</sup> Shows statistically significant difference in proportions using *chi*-squared test,  $P < 0.05$ .

<sup>c</sup> "Other – specified" includes American Indian or Alaskan Native, Asian or Pacific Islander, Native Hawaiian and Hispanic.

<sup>d</sup> High-volume chronic physical conditions, based on the HCUP Chronic Condition Indicator File (AHRQ, 2014), include endocrine, nutritional, metabolic, immunity disorders ( $n = 149,583$ ); diseases of the circulatory system ( $n = 142,822$ ); diseases of the nervous system and sense organs ( $n = 126,436$ ); diseases of the respiratory system ( $n = 119,877$ ); diseases of the musculoskeletal system ( $n = 113,709$ ); and diseases of the digestive system ( $n = 98,368$ ).

<sup>e</sup> Serious mental illness (SMI) and substance use disorder (SUD) defined as presence of ICD-9 codes in any setting during the study measurement period, as specified in Exhibit G (KDMS, 2015).

<sup>f</sup> Outpatient visits were restricted to those prior to the 1<sup>st</sup> nontraumatic dental ED visit for members with this outcome.

<sup>g</sup> Members with any outpatient dental visit(s) for restorative care had at least one visit with one or more Current Dental Terminology (CDT) codes for treatment, i.e., services not limited to preventive/diagnostic or pain/palliative care services. Members with pain/palliative care without restorative care had no visits for restorative care (treatment), but had at least one visit with the CDT code for pain/palliative care. Members with any preventive/diagnostic care, only, had no visits for restorative care and no visits for pain/palliative care, but did have at least one visit for preventive or diagnostic care.

MCO: managed care organization; BCBS: Blue Cross Blue Shield.



Statistically significant differences in proportions were observed for each BH diagnostic combination, evaluated separately (**Table 4**). Members with both schizophrenia and SUD had the highest NTDV rate for this BH diagnostic combination category (3.44%). Similarly, members with both bipolar disorder and SUD had the highest NTDV rate for this BH diagnostic combination category (3.68%). This pattern of members with dual BH diagnosis and SUD having the highest NTDV rate was also observed for the depressive order and PTSD diagnostic combination categories.

**Table 4: NTDV Frequencies and Rates – Serious Mental Illness and Substance Use Disorder**

<b>SMI and SUD Diagnostic Combinations<sup>a</sup></b>	<b>Total BH Population # (Population Proportion)</b>	<b>NTDV<sup>b</sup> #(NTDV Rate)</b>
Total # Members	292,432 (100%)	6,536 (2.24%)
<b>Schizophrenia, SUD<sup>c</sup></b>		
Neither <sup>d</sup>	249,515 (85.32%)	5,520 (2.21%)
Schizophrenia, only <sup>d</sup>	9,399 (3.21%)	151 (1.61%)
SUD, only <sup>d</sup>	31,510 (10.78%)	796 (2.53%)
Both	2,008 (0.69%)	69 (3.44%)
<b>Bipolar disorders, SUD<sup>c</sup></b>		
Neither <sup>d</sup>	253,983 (86.85%)	5,554 (2.19%)
Bipolar disorders, only <sup>d</sup>	4,931 (1.69%)	117 (2.37%)
SUD, only <sup>d</sup>	32,348 (11.06%)	822 (2.54%)
Both	1,170 (0.40%)	43 (3.68%)
<b>Depressive disorders, SUD<sup>c</sup></b>		
Neither <sup>d</sup>	169,644 (58.01%)	4,007 (2.36%)
Depressive disorders, only <sup>d</sup>	89,270 (30.53%)	1,664 (1.86%)
SUD, only <sup>d</sup>	19,619 (6.71%)	491 (2.50%)
Both	13,899 (4.75%)	374 (2.69%)
<b>Trauma related disorders (e.g., PTSD), SUD<sup>c</sup></b>		
Neither <sup>d</sup>	249,753 (85.41%)	5,442 (2.18%)
Trauma related disorders, only <sup>d</sup>	9,161 (3.13%)	229 (2.50%)
SUD, only <sup>d</sup>	31,275 (10.69%)	803 (2.57%)
Both	2,243 (0.77%)	62 (2.76%)

<sup>a</sup> Diagnostic categories defined as presence of ICD-9 codes in any setting during the study measurement period, per ICD-9 codes specified in Exhibit G (KDMS, 2015).

<sup>b</sup> Members included were those with any (one or more) nontraumatic dental ED visit (NTDV).

<sup>c</sup> Shows statistically significant differences in proportions using the *chi*-squared test statistic,  $P < 0.05$ .

<sup>d</sup> Members may have additional behavioral health (BH) diagnoses other than those indicated for that particular behavioral health diagnostic combination.

SMI: serious mental illness; PTSD: post-traumatic stress disorder.

## Demographic, Clinical and Access-Related Factors by Type of Outpatient Dental Visit

**Table 5** presents outpatient dental visit frequencies and rates for the study period (June 1, 2014–May 31, 2015); therefore, these visits are not restricted to visits prior to the first NTDV for members with that outcome. Of the 292,432 total Kentucky MMC BH population, there were 69,214 (23.67%) members who had an outpatient dental visit for restorative care (i.e., any dental visit type other than exclusively for preventive/diagnostic or pain/palliative care); 3,388 (1.16%) with an outpatient dental visit for pain/palliative care without restorative care; 19,465 (6.66%) with an outpatient dental visit for preventive/diagnostic services (without visits for restorative care or pain/palliative care); and 200,365 (68.52%) without any outpatient dental visits.

Demographic factors showed statistically significant differences in the proportion of members by outpatient dental visit type (**Table 5**). Among the race/ethnicity subgroups, members of white race/ethnicity constituted the greatest race/ethnicity prevalence across all outpatient dental visit types. Members of black race/ethnicity had the highest rate for having an outpatient dental visit for pain/palliative care without any restorative care visit (1.27%). Members with race/ethnicity characterized as “other-specified” had the highest rate for having no outpatient dental visits (70.63%), whereas members with race/ethnicity characterized as “other-not specified” had the highest outpatient restorative dental visit rate (25.88%). Males had a higher rate for having no outpatient dental visit (71.79%), and lower rates for outpatient dental restorative care (21.82%), pain/palliative care visits without restorative care (1.03%) and preventive/diagnostic visits without restorative care (5.36%). The proportion with an outpatient dental visit for pain/palliative care without restorative care decreases with increasing age, as does the proportion with an outpatient dental visit for preventive/diagnostic services without restorative or pain/palliative care (**Table 5**). The proportion of members without any outpatient dental visit increases with older age. Appalachian county residents have the highest rate for pain/palliative care visits without restorative care (1.36%), whereas urban residents have the highest rate for preventive/diagnostic visits without restorative or pain/palliative care (7.83%), and rural residents have the highest rate for lacking any outpatient dental visits (72.05%).

Clinical factors showed statistically significant differences in the proportion of members by outpatient dental visit type (**Table 5**). Among members with chronic physical health conditions, as the number of conditions increases, there is a general trend of decreasing rates for restorative outpatient dental visits, pain/palliative care without restorative dental visits, and preventive/diagnostic without restorative or pain/palliative care visits. Members with both SMI and SUD had the highest rate for outpatient restorative care dental visits (26.50%) and the lowest rate of lacking any outpatient dental visits (65.54%).

Access-related factors also showed statistically significant differences in the proportion of members by outpatient dental visit type (**Table 5**). Members enrolled in Passport Health Plan had the highest rates of having each outpatient dental visit type, and the lowest rate for members lacking any dental visits (63.41%). Anthem Blue Cross Blue Shield (BCBS) Medicaid had the highest rate for members lacking any dental visits (73.10%). Members with only PCP visits have the highest rates of each outpatient dental visit type, and the lowest rate of no dental visits (62.81%); whereas members with neither PCP nor BH provider visits have the lowest rates of each outpatient dental visit type and the highest rate of lacking any dental visit (74.15%).

Table 5: Outpatient Dental Visit Type Frequencies and Rates-- Demographic, Clinical and Access-Related Factors

Categories # (Population Proportion)	Any Outpatient Dental Visit (DV) <sup>a</sup>			
	Treatment/Restorative Care <sup>b</sup> # (Rate)	Pain/Palliative Care No Restorative Care <sup>b</sup> # (Rate)	Preventive/Diagnostic No Restorative Care or Pain/Palliative Care <sup>b</sup> # (Rate)	No DVs # (Rate)
Total (n = 292,432; 100%)	69,214 (23.67%)	3,388 (1.16%)	19,465 (6.66%)	200,365 (68.52%)
<b>Demographic factors:</b>				
Race <sup>c</sup>				
White (170,430; 58.28%)	39,355 (23.09%)	1,953 (1.15%)	10,748 (6.31%)	118,374 (69.46%)
Black (17,678; 6.05%)	4,153 (23.49%)	224 (1.27%)	1,465 (8.29%)	11,836 (66.95%)
Other – specified <sup>d</sup> (882; 0.30%)	187 (21.20%)	2 (0.23%)	70 (7.94%)	623 (70.63%)
Other – not specified (34,795; 11.90%)	9,004 (25.88%)	371 (1.07%)	2,382 (6.85%)	23,038 (66.21%)
Not reported (68,647; 23.47%)	16,515 (24.06%)	838 (1.22%)	4,800 (6.99%)	46,494 (67.73%)
Sex <sup>c</sup>				
Female (185,804; 63.54%)	45,950 (24.73%)	2,289 (1.23%)	13,748 (7.40%)	123,817 (66.64%)
Male (106,628; 36.46%)	23,264 (21.82%)	1,099 (1.03%)	5,717 (5.36%)	76,548 (71.79%)
Age group <sup>c</sup>				
18–27 years (51,528; 17.62%)	14,627 (28.39%)	835 (1.62%)	5,097 (9.89%)	30,969 (60.10%)
28–37 years (71,512; 24.45%)	21,050 (29.44%)	1,071 (1.50%)	5,433 (7.60%)	43,958 (61.47%)
38–47 years (62,632; 21.42%)	15,880 (25.35%)	676 (1.08%)	3,985 (6.36%)	42,091 (67.20%)
48–57 years (64,901; 22.19%)	12,798 (19.72%)	553 (0.85%)	3,336 (5.14%)	48,214 (74.29%)
58+ years (41,859; 14.31%)	4,859 (11.61%)	253 (0.60%)	1,614 (3.86%)	35,133 (83.93%)
Geographic area of residence <sup>c</sup>				
Appalachian county (127,038; 43.44%)	30,751 (24.21%)	1,730 (1.36%)	7,391 (5.82%)	87,166 (68.61%)
Non-Appalachian county – rural (46,494; 15.90%)	9,838 (21.16%)	387 (0.83%)	2,770 (5.96%)	33,499 (72.05%)
Non-Appalachian county – urban (118,900; 40.66%)	28,625 (24.07%)	1,271 (1.07%)	9,304 (7.83%)	79,700 (67.03%)
<b>Clinical factors:</b>				
Physical health – members with high-volume chronic physical conditions <sup>c,e</sup>				
0 conditions (50,610; 17.31%)	12,038 (23.79%)	629 (1.24%)	3,630 (7.17%)	34,313 (67.80%)
1 condition (48,701; 16.65%)	12,729 (26.14%)	615 (1.26%)	3,664 (7.52%)	31,693 (65.08%)
2 conditions (48,787; 16.68%)	12,167 (24.94%)	602 (1.23%)	3,417 (7.00%)	32,601 (66.82%)
3–4 conditions (90,064; 30.80%)	20,970 (23.28%)	972 (1.08%)	5,688 (6.32%)	62,434 (69.32%)
5–6 conditions (54,270; 18.56%)	11,310 (20.84%)	570 (1.05%)	3,066 (5.65%)	39,324 (72.46%)
Behavioral health – serious mental illness (SMI) and/or substance use disorder (SUD) <sup>c,f</sup>				
Neither (159,627; 54.59%)	36,446 (22.83%)	1,738 (1.09%)	10,255 (6.42%)	111,188 (69.65%)

Categories # (Population Proportion)	Any Outpatient Dental Visit (DV) <sup>a</sup>			
	Treatment/Restorative Care <sup>b</sup> # (Rate)	Pain/Palliative Care No Restorative Care <sup>b</sup> # (Rate)	Preventive/Diagnostic No Restorative Care or Pain/Palliative Care <sup>b</sup> # (Rate)	No DVs # (Rate)
SMI, only (99,287; 33.95%)	24,359 (24.53%)	1,162 (1.17%)	7,108 (7.16%)	66,658 (67.14%)
SUD, only (18,183; 6.22%)	4,345 (23.90%)	280 (1.54%)	1,090 (5.99%)	12,468 (68.57%)
Both SMI and SUD (15,335; 5.24%)	4,064 (26.50%)	208 (1.36%)	1,012 (6.60%)	10,051 (65.54%)
<b>Access-related factors:</b>				
MCO <sup>c</sup>				
Passport Health Plan (56,960; 19.48%)	15,697 (27.56%)	717 (1.26%)	4,430 (7.78%)	36,116 (63.41%)
WellCare of Kentucky (118,460; 40.51%)	28,882 (24.38%)	1,442 (1.22%)	7,577 (6.40%)	80,559 (68.01%)
Aetna Better Health of Kentucky (71,040; 24.29%)	15,575 (21.92%)	704 (0.99%)	4,477 (6.30%)	50,284 (70.78%)
Humana-CareSource (28,531; 9.76%)	5,620 (19.70%)	350 (1.23%)	1,904 (6.67%)	20,657 (72.40%)
Anthem BCBS Medicaid (17,441; 5.96%)	3,440 (19.72%)	175 (1.00%)	1,077 (6.18%)	12,749 (73.10%)
Any visits to primary care providers (PCPs) and/or behavioral health (BH) providers <sup>c</sup>				
Both PCP and BH providers (206,978; 70.78%)	48,591 (23.48%)	2,330 (1.13%)	13,663 (6.60%)	142,394 (68.80%)
PCP visits, only (46,670; 15.96%)	12,999 (27.85%)	640 (1.37%)	3,717 (7.96%)	29,314 (62.81%)
BH provider visits, only (6,956; 2.38%)	1,405 (20.20%)	75 (1.08%)	419 (6.02%)	5,057 (72.70%)
Neither (31,828; 10.88%)	6,219 (19.54%)	343 (1.08%)	1,666 (5.23%)	23,600 (74.15%)

<sup>a</sup> Study period was June 1, 2014–May 31, 2015; therefore, these visits are not restricted to visits prior to the first nontraumatic dental ED visit (NTDV) for members with that outcome.

<sup>b</sup> Members with any outpatient dental visit(s) for restorative care had at least one visit with one or more Current Dental Terminology (CDT) codes for treatment, i.e., services not limited to preventive/diagnostic or pain/palliative care services. Members with pain/palliative care without restorative care had no visits for restorative care (treatment), but had at least one visit with the CDT code for pain/palliative care. Members with any preventive/diagnostic care, only, had no visits for restorative care and no visits for pain/palliative care, but did have at least one visit for preventive or diagnostic care.

<sup>c</sup> Shows statistically significant difference in proportions using *chi*-squared test,  $P < 0.05$ .

<sup>d</sup> “Other – specified” includes American Indian or Alaskan Native, Asian or Pacific Islander, Native Hawaiian and Hispanic.

<sup>e</sup> High-volume chronic physical condition categories, based on the HCUP Chronic Condition Indicator File (AHRQ, 2014), include endocrine, nutritional, metabolic, immunity disorders ( $n = 149,583$ ); diseases of the circulatory system ( $n = 142,822$ ); diseases of the nervous system and sense organs ( $n = 126,436$ ); diseases of the respiratory system ( $n = 119,877$ ); diseases of the musculoskeletal system ( $n = 113,709$ ); and diseases of the digestive system ( $n = 98,368$ ).

<sup>f</sup> Serious mental illness (SMI) and substance use disorder (SUD) defined as presence of ICD-9 codes in any setting during the study measurement period, as specified in Exhibit G (KDMS, 2015).

DV: dental visit; MCO: managed care organization; BCBS: Blue Cross Blue Shield.

## Risk Factors for Lack of Any Outpatient Dental Visits

**Table 6** presents multiple logistic regression findings for the relationships, or association, between the outcome of lack of any outpatient dental visits during the study period and demographic, clinical and access-related factors. The measure of association is the adjusted odds ratio (AOR). The AOR was calculated using statistical software that statistically adjusted for the influence of the other factors on each outcome in order to facilitate an interpretation of an independent association between each factor (relative to its referent group) and the outcome of lack of any outpatient dental visits. Demographic factors with statistically significant associations with the outcome of lack of any outpatient dental visits, independent of other demographic, clinical and access-related factors, were the following:

- Compared to urban residents, members residing in rural counties had 21% greater odds for lacking any outpatient dental visits (AOR = 1.21; 95% confidence interval [CI] = 1.18, 1.24).
- Compared to members aged 58 years and older, younger members had lesser risk for lacking any outpatient dental visit, ranging from 75% lesser odds (AOR for members aged 18–27 years = 0.25; 95% CI = 0.24, 0.26) to 46% lesser odds (AOR for members aged 48–57 years = 0.54; 95% CI = 0.53, 0.56).
- Compared to females, males had 19% greater odds for lacking any outpatient dental visit (AOR = 1.19; 95% CI = 1.17, 1.21).
- Compared to members of white race/ethnicity, all other race/ethnicity categories except for “Other – specified” showed significantly lesser odds for lacking any outpatient dental visit; however, the magnitude of the estimated effect was small, ranging from 6% lesser odds (AOR for “Not provided” = 0.94; 95% CI = 0.92, 0.96) to 11% lesser odds (AOR for “Other – unspecified” = 0.89; 95% CI = 0.86, 0.91).

Clinical factors with statistically significant associations with the outcome of lack of any outpatient dental visits, independent of other demographic, clinical and access-related factors (**Table 6**), were the following:

- Compared to members without any of the high-volume chronic physical conditions, the odds for lacking any outpatient dental visit were lower among members with a chronic physical condition, ranging from 10% lesser odds (AOR for “1 chronic condition” = 0.90; 95% CI = 0.87, 0.92) to 17% lesser odds (AOR for “5–6 chronic conditions” = 0.83; 95% CI = 0.80, 0.86).
- Compared to members without a diagnosis of SMI or SUD, members with only SMI had 7% lesser odds (AOR = 0.93; 95% CI = 0.92, 0.95), and members with both SMI and SUD had 5% lesser odds (AOR = 0.95; 95% CI = 0.91, 0.98).

Access-related factors with statistically significant associations with the outcome of lack of any outpatient dental visits, independent of other demographic, clinical and access-related factors (**Table 6**), were the following:

- Compared to enrollees in the MCO with the lowest NTDV rate, enrollees in the other MCOs had greater odds for lacking any outpatient dental visits, ranging from 21% greater odds (AOR = 1.21; 95% CI = 1.18, 1.24) to 55% greater odds (AOR = 1.55; 95% CI = 1.49, 1.61).
- Compared to members with visits to both PCPs and BH providers, members with visits to neither had 43% greater odds for lacking any outpatient dental visit (AOR = 1.43; 95% CI = 1.39, 1.48), members with only visits to BH providers had 40% greater odds for lacking any outpatient dental visit (AOR = 1.40; 95% CI = 1.32, 1.48), and member with only visits to PCPs had 14% lesser odds for lacking any outpatient dental visits (AOR = 0.86; 95% CI = 0.84, 0.88).

**Table 6: Lack of Any Outpatient Dental Visits: Multiple Logistic Regression Analysis of Risk Factors**

Categories <sup>a</sup>	AOR <sup>b</sup>	95% CI
<b>Demographic factors:</b>		
Race		
White	1.00 (referent)	-
Black	0.93	0.90, 0.97
Other –specified <sup>c</sup>	1.01	0.87, 1.17
Other – not specified	0.89	0.86, 0.91
Not reported	0.94	0.92, 0.96
Sex		
Female	1.00 (referent)	-

Categories <sup>a</sup>	AOR <sup>b</sup>	95% CI
Male	1.19	1.17, 1.21
Age group		
18–27 years	0.25	0.24, 0.26
28–37 years	0.28	0.27, 0.28
38–47 years	0.38	0.36, 0.39
48–57 years	0.54	0.53, 0.56
58+ years	1.00 (referent)	-
Geographic area of residence		
Appalachian county	0.98	0.96, 1.00
Non-Appalachian county – rural	1.21	1.18, 1.24
Non-Appalachian county – urban	1.00 (referent)	-
<b>Clinical factors:</b>		
Physical health – members with high-volume chronic physical conditions <sup>d</sup>		
0 conditions	1.00 (referent)	-
1 condition	0.90	0.87, 0.92
2 conditions	0.88	0.85, 0.90
3–4 conditions	0.83	0.81, 0.85
5–6 conditions	0.83	0.80, 0.86
Behavioral health – serious mental illness (SMI) and/or substance use disorder (SUD) <sup>e</sup>		
Neither	1.00 (referent)	-
SMI, only	0.93	0.92, 0.95
SUD, only	1.01	0.98, 1.05
Both SMI and SUD	0.95	0.91, 0.98
<b>Access-related factors:</b>		
MCO		
Passport Health Plan	1.00 (referent)	-
WellCare of Kentucky	1.21	1.18, 1.24
Aetna Better Health of Kentucky	1.34	1.30, 1.37
Humana-CareSource	1.49	1.44, 1.54
Anthem BCBS Medicaid	1.55	1.49, 1.61
Any visits to primary care providers (PCPs) and/or behavioral health (BH) providers		
Both PCP and BH providers	1.00 (referent)	-
PCP visits, only	0.86	0.84, 0.88
BH provider visits, only	1.40	1.32, 1.48
Neither	1.43	1.39, 1.48

<sup>a</sup> Categories of possible risk factors evaluated in multiple logistic regression analysis.

<sup>b</sup> Multiple logistic regression results for the relationship between the lack of any outpatient dental visits and risk factors. Each risk factor was statistically adjusted for the influence of the other risk factors on the outcome in order to facilitate an interpretation of an independent association between each risk factor (relative to its referent group) and the outcome of lack of any outpatient dental visit (i.e., AOR).

<sup>c</sup> “Other – specified” includes American Indian or Alaskan Native, Asian or Pacific Islander, Native Hawaiian and Hispanic.

<sup>d</sup> High-volume chronic physical condition categories, based on the HCUP Chronic Condition Indicator File (AHRQ, 2014), include endocrine, nutritional, metabolic, immunity disorders; diseases of the circulatory system; diseases of the nervous system and sense organs; diseases of the respiratory system; diseases of the musculoskeletal system; and diseases of the digestive system.

<sup>e</sup> Serious mental illness (SMI) and substance use disorder (SUD) defined as presence of ICD-9 codes in any setting during the study measurement period, as specified in Exhibit G (KDMS, 2015).

MCO: managed care organization; BCBS; Blue Cross Blue Shield.



## Outpatient Dental Visit Subtypes

Member counts and percentages by specific dental outpatient visit subtype for the total MMC BH population and for the subset of members with any NTDVs are presented in **Table 7**. It should be noted that members may fall into more than one of these outpatient dental visit subtype categories, as these categories are not mutually exclusive.

Members with outpatient dental visit(s) for oral and maxillofacial surgery (includes extractions and other oral surgical procedures) comprised the greatest proportion of members with an outpatient dental visit (13.27%), and smaller proportions of members had outpatient dental visits for preventive (8.94%) and restorative (specific; 10.72%) reasons (**Table 7**). Only members with preventive visits had a lower NTDV rate (2.10%) than the overall rate for the BH population (2.24%). On the other hand, members with outpatient dental visits in the “other” category had the highest NTDV rate (8.86%).

**Table 7: Utilization of Outpatient Dental Visits by Outpatient Dental Visit Subtypes.**

Outpatient Dental Visit (DV) Subtype <sup>a</sup>	Total # Members with Outpatient DV Subtype and Population Proportions # (Column %)	# Members with Any NTDVs and NTDV Rate # (Row %)
Total number of members	292,432 (100.00%)	6,536 (2.24%)
Oral and maxillofacial surgery: <sup>b</sup> CDT codes D7000-D7999	38,802 (13.27%)	2,711 (6.99%)
Diagnostic: CDT codes D0100-D0999	36,428 (12.46%)	2,512 (6.90%)
Restorative, specific: <sup>c</sup> CDT codes D2000-D2999	31,337 (10.72%)	773 (2.47%)
Preventive: <sup>d</sup> CDT codes D1000-D1999	26,142 (8.94%)	549 (2.10%)
Palliative treatment of dental pain: <sup>e</sup> CDT code D9110	13,340 (4.56%)	1,023 (7.67%)
Other: CDT codes not identified in this table	7,553 (2.58%)	669 (8.86%)
Periodontics: CDT codes D4000-D4999	7,075 (2.42%)	195 (2.76%)
Endodontics: <sup>f</sup> CDT codes D3000-D3999	580 (0.20%)	47 (8.10%)
Prosthodontics, removable: <sup>g</sup> CDT codes D5000-D5899	160 (0.05%)	7 (4.38%)
Intravenous sedation: CDT code D9241	152 (0.05%)	10 (6.58%)
Orthodontics: CDT codes D8000-D8999	110 (0.04%)	5 (4.55%)
Prosthodontics, fixed: CDT codes D6200-D6999	11 (0.00%)	0 (0.00%)
Implant services: CDT codes D6000-D6199	12 (0.00%)	0 (0.00%)
Maxillofacial prosthetics: CDT codes D5900-D5999	2 (0.00%)	0 (0.00%)

<sup>a</sup> Members with multiple outpatient dental visits may have had visits in several categories. Outpatient dental visits were not restricted to those that occurred before nontraumatic dental ED visit, so included visits during the study period from June 1, 2014–May 31, 2015.

<sup>b</sup> This category includes Current Dental Terminology (CDT) codes for extractions and other oral surgical procedures.

<sup>c</sup> Restricted to CDT codes D2000-D2999, so does not represent the aggregate “restorative” category comprised of members with any outpatient dental visit other than preventive, diagnostic and palliative treatment of dental pain. According to the Kentucky Medicaid Dental Services rate schedule effective April 1, 2009- ongoing, restorative procedures that are covered for adults include amalgam and resin for one or multiple surfaces; however, prefabricated crowns are non-covered procedures (KDMS, 2016a).

<sup>d</sup> Restricted to CDT codes D1000-D1999, so does not represent the aggregate “Preventive/Diagnostic care, only” category comprised of members with any preventive and diagnostic outpatient dental visits.

<sup>e</sup> Members with this visit type may have also had a restorative or other treatment visit, so member count does not correspond to the “Pain/Palliative care without restorative care, only” category comprised of members who had an outpatient dental visit for pain/palliative care, but not restorative care/treatment.

<sup>f</sup> According to the Kentucky Medicaid Dental Services rate schedule effective April 1, 2009-ongoing, endodontic procedures covered for adults include apicoectomy and gingivoplasty; however, pulp cap, therapeutic pulpotomy and root canal therapy are non-covered procedures.

<sup>g</sup> According to the Kentucky Medicaid Dental Services rate schedule effective April 1, 2009-ongoing, prosthodontics, removable, procedures covered for adults include prosthetics for nasal, auricular, facial, obturator, mandibular and palatal, as well as oral surgical splint and speech aid; however, replace missing/broken teeth-denture, repair resin

denture base, repair cast framework, replace broken teeth-per tooth/denture, reline complete maxillary denture, reline complete mandibular denture and interim partial denture (maxillary and mandibular) are non-covered services.  
NTDV: nontraumatic dental ED visit.

## NTDV and Multiple NTDVs by Primary ED Diagnosis

Of the 6,536 members with any NTDV, most (59.06%) had a non-specified primary diagnosis, i.e., “Other diseases and conditions of the teeth and supporting structures” (“Other”; **Table 8**). There were 1,237 members who had multiple (i.e., more than one) NTDVs (18.93%) and, among that subset of members, the vast majority (80.19%) had a non-specified primary diagnosis of “Other.” The diagnostic subgroup with the next highest proportion, for both NTDV and MNTDV, was comprised of members with an NTDV for diseases of pulp (contains the root canal) and periapical tissues (27.82% and 40.42%, respectively). The highest MNTDV rate was among members with an ED visit for disease of hard tissues of teeth (including dental caries; 32.34%).

**Table 8: NTDV and MNTDVs by Primary ED Diagnosis**

Primary Emergency Department (ED) Diagnosis	Members with Any NTDV(s) # (Column %)	Members with MNTDVs # (Rate) (Column %)
Total	6,536 (100%)	1,237 (18.93%) (100%)
<b>Primary ED diagnosis for NTDV</b>		
Other diseases and conditions of the teeth and supporting structures <sup>a,f</sup>	3,860 (59.06%)	992 (25.70%) (80.19%)
Diseases of pulp (contains the root canal) and periapical tissues <sup>b,f</sup>	1,818 (27.82%)	500 (27.50%) (40.42%)
Diseases of hard tissues of teeth (includes dental caries) <sup>c,f</sup>	1,416 (21.66%)	458 (32.34%) (37.03%)
Gingival and periodontal diseases <sup>d,f</sup>	212 (3.24%)	50 (23.58%) (4.04%)
Disorders of tooth development and eruption <sup>e,f</sup>	26 (0.40%)	7 (26.92%) (0.57%)

a. Primary ED visit diagnosis coded as ICD-9 code 525.

b. Primary ED visit diagnosis coded as ICD-9 code 522.

c. Primary ED visit diagnosis coded as ICD-9 code 521.

d. Primary ED visit diagnosis coded as ICD-9 code 523.

e. Primary ED visit diagnosis coded as ICD-9 code 520.

f. Column frequencies and percentages exceed total frequencies and 100% due to members with multiple different NTDV subtypes.

NTDV: nontraumatic dental ED visit; MNTDV: multiple NTDV.



## NTDV Primary Diagnoses by Geographic Area of Residence

Among the 6,536 members with any NTDV(s), members residing in non-Appalachian, urban counties comprised the greatest proportion (49.05%), followed by members residing in Appalachian counties (33.83%) and members residing in non-Appalachian rural counties (17.12%; **Table 9**). Rates for non-specified (“Other”) NTDVs were highest among non-Appalachian urban residents (50.08%).

Table 9: NTDV Diagnoses Rates by Geographic Area of Residence

NTDV Diagnosis <sup>a</sup>	Total # (Column %)	Appalachian County Member Residence # (Row %)	Non-Appalachian Rural County Member Residence # (Row %)	Non-Appalachian Urban County Member Residence # (Row %)
Any NTDV type	6,536 (100%)	2,211 (33.83%)	1,119 (17.12%)	3,206 (49.05%)
Other diseases and conditions of the teeth and supporting structures <sup>b,g</sup>	3,860 (59.06%)	1,277 (33.08%)	650 (16.84%)	1,933 (50.08%)
Diseases of pulp (contains the root canal) and periapical tissues <sup>c,g</sup>	1,818 (27.82%)	684 (37.62%)	270 (14.85%)	864 (47.52%)
Diseases of hard tissues of teeth <sup>d,g</sup>	1,416 (21.66%)	421 (29.73%)	273 (19.28%)	722 (50.99%)
Gingival and periodontal diseases <sup>e,g</sup>	212 (3.24%)	95 (44.81%)	30 (14.15%)	87 (41.04%)
Disorders of tooth development and eruption <sup>f,g</sup>	26 (0.40%)	6 (23.08%)	7 (26.92%)	13 (50.00%)

<sup>a</sup> Includes members with one or more nontraumatic dental emergency department visit (NTDV).

<sup>b</sup> Primary ED visit diagnosis coded as ICD-9 code 525.

<sup>c</sup> Primary ED visit diagnosis coded as ICD-9 code 522.

<sup>d</sup> Primary ED visit diagnosis coded as ICD-9 code 521.

<sup>e</sup> Primary ED visit diagnosis coded as ICD-9 code 523.

<sup>f</sup> Primary ED visit diagnosis coded as ICD-9 code 520.

<sup>g</sup> Column frequencies and percentages exceed total frequencies and 100% due to members with multiple different visit subtypes.

## Ten Highest-NTDV-Volume Counties

The NTDV rate for the entire Kentucky BH MMC population was 2.89% (8,445 total NTDV visits/292,432 Kentucky BH MMC members; **Table 10**). The three counties with the highest NTDV rates were Kenton (9.13%), Grant (8.72%) and Campbell (7.00%), all urban counties located in the northernmost Region 6; followed by Boyd County, a transitional Appalachian county located in Region 7 (6.19%); and Grayson County, a rural county located in Region 3 (6.10%). Urban counties Grant and Kenton had the highest rate for members with three or more NTDV visits (0.75% and 0.52%, respectively), compared to 0.12% statewide for the Kentucky BH MMC population.

Among the subset of Kentucky BH MMC members with any NTDV (n = 6,536 members), Boyd County (Appalachian, transitional) had the highest rate of members without any outpatient dental visit (44.86%), compared to the corresponding statewide rate of 32.24% (**Table 10**). The most economically depressed counties (i.e., those that rank in the worst 10 percent of the nation’s counties) are classified as “distressed” by the Appalachian Regional Commission (ARC, 2016). The two distressed Appalachian counties, Harlan and Clay, had the highest rates of NTDV-utilizing members with an outpatient dental visit for pain/palliative care, but without a restorative visit (14.29% and 10.45%, respectively), compared to the corresponding statewide rate of 3.81%.

Table 10: State and County NTDV for the Ten Highest-NTDV-Volume Counties in Kentucky

County <sup>a</sup>	Total MMC BH Population # (Column %)	Total MMC BH Population (n = 292,432): Total NTDV Rates by ED Visit Count Subsets				Subpopulation of Members with Any NTDV (n = 6,536): NTDV Rates by Member Receipt of Outpatient Dental Care Subsets			
		Total NTDVs <sup>a</sup> # (Rate) (Column %)	One Visit <sup>b</sup> # (Rate) (Column %)	Two Visits <sup>b</sup> # (Rate) (Column %)	Three or More Visits <sup>b</sup> # (Rate) (Column %)	Received Outpatient Restorative Care <sup>c</sup> #/NTDV (Rate) (Column %)	Received Outpatient Pain/ Palliative Care, No Restorative Care <sup>c</sup> #/NTDV (Rate) (Column %)	Received Outpatient Preventive/ Diagnostic, only #/NTDV (Rate) (Column %)	Received No Outpatient Dental Visits <sup>c</sup> #/NTDV (Rate) (Column %)
State total	292,432 (100%)	8,445 (2.89%) (100%)	5,299 (1.81%) (100%)	878 (0.30%) (100%)	359 (0.12%) (100%)	3,489/6,536 (53.38%) (100%)	249/6,536 (3.81%) (100%)	691/6,536 (10.57) (100%)	2,107/6,536 (32.24%) (100%)
Kenton (urban)	9,005 (3.08%)	822 (9.13%) (9.73%)	450 (5.00%) (8.49%)	99 (1.10%) (11.28%)	47 (0.52%) (13.09%)	248/596 (41.61%) (7.11%)	8/596 (1.34%) (3.21%)	88/596 (14.77%) (12.74%)	252/596 (42.28%) (11.96%)
Grant (urban)	1,857 (0.64%)	162 (8.72%) (1.92%)	65 (3.50%) (1.23%)	20 (1.08%) (2.28%)	14 (0.75%) (3.90%)	55/99 (55.56%) (1.58%)	1/99 (1.01%) (0.40%)	11/99 (11.11%) (1.59%)	32/99 (32.32%) (1.52%)
Campbell (urban)	4,174 (1.43%)	292 (7.00%) (3.46%)	166 (3.98%) (3.13%)	35 (0.84%) (3.99%)	15 (0.36%) (4.18%)	104/216 (48.15%) (2.98%)	0	33/216 (15.28%) (4.78%)	79/216 (36.57%) (3.75%)
Boyd (Appalachian, transitional <sup>d</sup> )	4,313 (1.47%)	267 (6.19%) (3.16%)	131 (3.04%) (2.47%)	38 (0.88%) (4.33%)	16 (0.37%) (4.46%)	83/185 (44.86%) (2.38%)	0	19/185 (10.27%) (2.75%)	83/185 (44.86%) (3.94%)
Grayson (rural)	2,508 (0.86%)	153 (6.10%) (1.81%)	88 (3.51%) (1.66%)	14 (0.56%) (1.59%)	10 (0.40%) (2.79%)	50/112 (44.64%) (1.43%)	6/112 (5.36%) (2.41%)	9/112 (8.04%) (1.30%)	47/112 (41.96%) (2.23%)
Jessamine (urban)	3,108 (1.06%)	187 (6.02%) (2.21%)	111 (3.57%) (2.09%)	20 (0.64%) (2.28%)	11 (0.35%) (3.06%)	70/142 (49.30%) (2.01%)	6/142 (4.23%) (2.41%)	26/142 (18.31%) (3.76%)	40/142 (28.17%) (1.90%)
Harlan (Appalachian, distressed <sup>e</sup> )	4,102 (1.40%)	237 (5.78%) (2.81%)	101 (2.46%) (1.91%)	13 (0.32%) (1.48%)	19 (0.46%) (5.29%)	65/133 (48.87%) (1.86%)	19/133 (14.29%) (7.63%)	7/133 (5.26%) (1.01%)	42/133 (31.58%) (1.99%)

County <sup>a</sup>	Total MMC BH Population # (Column %)	Total MMC BH Population (n = 292,432): Total NTDV Rates by ED Visit Count Subsets				Subpopulation of Members with Any NTDV (n = 6,536): NTDV Rates by Member Receipt of Outpatient Dental Care Subsets			
		Total NTDVs <sup>a</sup> # (Rate) (Column %)	One Visit <sup>b</sup> # (Rate) (Column %)	Two Visits <sup>b</sup> # (Rate) (Column %)	Three or More Visits <sup>b</sup> # (Rate) (Column %)	Received Outpatient Restorative Care <sup>c</sup> #/NTDV (Rate) (Column %)	Received Outpatient Pain/Palliative Care, No Restorative Care <sup>c</sup> #/NTDV (Rate) (Column %)	Received Outpatient Preventive/ Diagnostic, only #/NTDV (Rate) (Column %)	Received No Outpatient Dental Visits <sup>c</sup> #/NTDV (Rate) (Column %)
Clay (Appalachian, distressed <sup>e</sup> )	3,598 (1.23%)	205 (5.70%) (2.43%)	97 (2.70%) (1.83%)	28 (0.78%) (3.19%)	9 (0.25%) (2.51%)	61/134 (45.52%) (1.75%)	14/134 (10.45%) (5.62%)	11/134 (8.21%) (1.59%)	48/134 (35.82%) (2.28%)
Woodford (urban)	1,126 (0.39%)	61 (5.42%) (0.72%)	29 (2.58%) (0.55%)	7 (0.62%) (0.80%)	5 (0.44%) (1.39%)	21/41 (51.22%) (0.60%)	2/41 (4.88%) (0.80%)	2/41 (4.88%) (0.29%)	16/41 (39.02%) (0.76%)
Ohio (rural)	1,790 (0.61%)	96 (5.36%) (1.14%)	65 (3.63%) (1.23%)	12 (0.67%) (1.37%)	2 (0.11%) (0.56%)	44/79 (55.70%) (1.26%)	1/79 (1.27%) (0.40%)	10/79 (12.66%) (1.45%)	24/79 (30.38%) (1.14%)

<sup>a</sup> Total nontraumatic dental emergency department visit (NTDV) count represents total number of visits (n = 8,445), with counties ordered from highest to lowest NTDV rates.

Total number of members with an NTDV = 6,536.

<sup>b</sup> These columns represent the number of members, so do not add up to the total number of NTDVs in the third column of this table.

<sup>c</sup> The number of NTDV utilizers within each dental outpatient visit category is divided by the total number of NTDV utilizers for each geographic area. For the state, there were 6,536 NTDV utilizers. For each county, the number of NTDV utilizers is indicated by the denominator.

<sup>d</sup> “Appalachian, transitional” represents counties transitioning between strong and weak economies (ARC, 2016).

<sup>e</sup> “Appalachian, distressed” represents the most economically depressed counties, i.e., rank among the worst 10% of U.S. counties (ARC, 2016).

BH: behavioral health; ED: emergency department.

**Table 11** presents findings regarding timing of dental outpatient visits by visit type, among Kentucky BH MMC members with an NTDV. In this subset of members, 61.51% had an outpatient restorative visit only after the NTDV, 60.06% had an outpatient preventive/diagnostic visit only after the NTDV, and 58.23% had an outpatient pain/palliative care visit only after the NTDV.

**Table 11: Timing of Outpatient Dental Visits by Visit Type for Members with NTDV(s) – Entire State**

Dental Visit (DV) Type	Count	Percentage
All members with any NTDV <sup>a</sup>	6,536	100%
No outpatient DVs	2,107/6,536	32.24%
Pain/Palliative care outpatient DV, no restorative outpatient DV	249/6,536	3.81%
Before 1 <sup>st</sup> ED visit, only <sup>b</sup>	89/249	35.74%
After 1 <sup>st</sup> ED visit, only <sup>b</sup>	145/249	58.23%
Before and after 1 <sup>st</sup> ED visit <sup>b</sup>	15/249	6.02%
Preventive/Diagnostic outpatient DV, no restorative or pain/palliative care DV	691/6,536	10.57%
Before 1 <sup>st</sup> ED visit, only <sup>b</sup>	209/691	30.25%
After 1 <sup>st</sup> ED visit, only <sup>b</sup>	415/691	60.06%
Before and after 1 <sup>st</sup> ED visit <sup>b</sup>	67/691	9.70%
Restorative outpatient DV	3,489/6,536	53.38%
Before 1 <sup>st</sup> ED visit, only <sup>b</sup>	702/3,489	20.12%
After 1 <sup>st</sup> ED visit, only <sup>b</sup>	2,146/3,489	61.51%
Before and after 1 <sup>st</sup> ED visit <sup>b</sup>	641/3,489	18.37%

<sup>a</sup> Members included were those with “any NTDV,” meaning one or more NTDVs (n = 6,536).

<sup>b</sup> First nontraumatic dental emergency department visit (NTDV) during the study period, June 1, 2014–May 31, 2015. Member may have had NTDV(s) prior to study period, as well as subsequent NTDV(s).

ED: emergency department.

**Table A1 (Appendix A)** presents findings regarding timing of dental outpatient visits by visit type and by county, among the top-ten counties with the highest NTDV rates. Counties with rates greater than the state rate for restorative outpatient dental visits that occurred only after the NTDV (61.51%) were Kenton (urban; 70.16%), Campbell (urban; 68.27%), Grayson (rural; 64.00%), Woodford (urban; 66.67%), and Ohio (rural; 65.91%). Counties with rates greater than the state rate for preventive/diagnostic outpatient dental visits that occurred only after the NTDV (60.06%) were Kenton (urban; 63.64%), Campbell (urban; 63.64%), Boyd (Appalachian, transitional; 63.16%), and Ohio (rural; 90.00%).

## Risk Factors for NTDV

**Table 12** presents multiple logistic regression findings for the relationships between the outcome of a member having any NTDV and demographic, clinical and access-related factors. Demographic factors with statistically significant associations with any NTDV were the following:

- Compared to members of white race/ethnicity, members of black race/ethnicity had 20% lesser odds for NTDV (AOR = 0.80; 95% CI = 0.71, 0.90).
- Compared to females, males had 20% greater odds for NTDV (AOR = 1.20; 95% CI = 1.14, 1.26).
- Compared to members aged 58 years and older, members aged 18–27 had more than 13 times greater odds for NTDV (AOR = 13.08; 95% CI = 10.80, 15.84), with elevated odds observed across all other age groups, as well as a significant trend for increased odds with decreasing age.
- Compared to members residing in non-Appalachian urban counties, members residing in Appalachian counties had 35% lesser odds for NTDV (AOR = 0.65; 95% CI = 0.61, 0.69) and members residing in non-Appalachian rural counties had 8% lesser odds for NTDV (AOR = 0.92; 95% CI = 0.85, 0.98).

Clinical factors with statistically significant associations with any NTDV (**Table 12**), were the following:

- Compared to members with 0 chronic physical conditions, members with 5-6 conditions had 15% greater odds for NTDV (AOR = 1.15; 95% CI = 1.03, 1.27) and members with 1 condition had 10% greater odds for NTDV (AOR = 1.10; 95% CI = 1.02, 1.19).
- Compared to members with neither SMI nor a diagnosis of substance use disorder (SUD), members with both SMI and SUD had 23% greater odds for NTDV (AOR = 1.23; 95% CI = 1.10, 1.37) and members with only SMI had 7% lesser odds for NTDV (AOR = 0.93; 95% CI = 0.88, 0.99; **Table 12**).

Access-related factors with statistically significant associations with any NTDV, independent of other demographic, clinical and access-related factors (**Table 12**), were the following:

- Compared to membership in the MCO with the lowest NTDV rate (i.e., Passport Health Plan; 2.07%), increased odds for NTDV were observed for each of the MCOs (Anthem BCBS Medicaid: AOR = 1.56; 95% CI = 1.40, 1.74); WellCare of Kentucky: AOR = 1.33; 95% CI = 1.24, 1.43; Aetna Better Health of Kentucky: AOR = 1.24; 95% CI = 1.14, 1.34; Humana-CareSource: AOR = 1.19; 95% CI = 1.08, 1.31).
- Compared to members with an outpatient dental restorative care visit, members with an outpatient dental visit for pain/palliative care without restorative care had more than 3 times greater odds for NTDV (AOR = 3.22; 95% CI = 2.77, 3.74); members with an outpatient dental visit for preventive/diagnostic services, only, had 69% greater odds for NTDV (AOR = 1.69; 95% CI = 1.54, 1.86); and members without any outpatient dental visit had 21% greater odds for NTDV (AOR = 1.21; 95% CI = 1.14, 1.29).
- Compared to members with visits to both PCPs and BH providers, members with neither had 79% greater odds for NTDV (AOR = 1.79; 95% CI = 1.67, 1.91).

**Table 12: NTDV Outcome: Multiple Logistic Regression Analysis of Risk Factors.**

Categories <sup>a</sup>	AOR <sup>b</sup>	95% CI
<b>Demographic factors:</b>		
Race		
White	1.00 (referent)	-
Black	0.80	(0.71, 0.90)
Other – specified <sup>c</sup>	0.58	(0.31, 1.09)
Other – not specified	1.06	(0.98, 1.14)
Not reported	1.22	(1.15, 1.29)
Sex		
Female	1.00 (referent)	-
Male	1.20	(1.14, 1.26)
Age group		
18–27 years	13.08	(10.80, 15.84)
28–37 years	11.65	(9.65, 14.06)
38–47 years	6.79	(5.62, 8.22)
48–57 years	3.44	(2.82, 4.18)
58+ years	1.00 (referent)	-
Geographic area of residence		
Appalachian county	0.65	(0.61, 0.69)
Non-Appalachian county – rural	0.92	(0.85, 0.98)
Non-Appalachian county – urban	1.00 (referent)	-
<b>Clinical factors:</b>		
Physical health – members with high-volume chronic physical conditions <sup>d</sup>		
0 conditions	1.00 (referent)	-
1 condition	1.10	(1.02, 1.19)
2 conditions	1.07	(0.98, 1.16)
3–4 conditions	1.08	(1.00, 1.17)
5–6 conditions	1.15	(1.03, 1.27)

Categories <sup>a</sup>	AOR <sup>b</sup>	95% CI
Behavioral health – serious mental illness (SMI) and/or substance use disorder (SUD) <sup>e</sup>		
Neither	1.00 (referent)	-
SMI, only	0.93	(0.88, 0.99)
SUD, only	1.01	(0.92, 1.12)
Both SMI and SUD	1.23	(1.10, 1.37)
<b>Access-related factors:</b>		
MCO		
Passport Health Plan	1.00 (referent)	-
WellCare of Kentucky	1.33	(1.24, 1.43)
Aetna Better Health of Kentucky	1.24	(1.14, 1.34)
Humana-CareSource	1.19	(1.08, 1.31)
Anthem BCBS Medicaid	1.56	(1.40, 1.74)
Any outpatient dental visits <sup>f</sup>		
Restorative care <sup>g</sup>	1.00 (referent)	-
Pain/Palliative care without restorative care, only <sup>g</sup>	3.22	(2.77, 3.74)
Preventive/Diagnostic care, only <sup>g</sup>	1.69	(1.54, 1.86)
None	1.21	(1.14, 1.29)
Any visits to primary care providers (PCPs) and/or behavioral health (BH) Providers		
Both PCP and BH providers	1.00 (referent)	-
PCP visits, only	1.04	(0.97, 1.12)
BH provider visits, only	0.93	(0.79, 1.09)
Neither	1.79	(1.67, 1.91)

<sup>a</sup> Categories of possible risk factors evaluated in multiple logistic regression analysis.

<sup>b</sup> Multiple logistic regression results for the relationship between the outcome of having one or more NTDVs and risk factors. Each risk factor was statistically adjusted for the influence of the other risk factors on the outcome in order to facilitate an interpretation of an independent association between each risk factor (relative to its referent group) and the outcome of having one or more NTDVs (i.e., AOR). There were 6,536 members with the outcome and 285,896 members without the outcome.

<sup>c</sup> “Other – specified” includes American Indian or Alaskan Native, Asian or Pacific Islander, Native Hawaiian and Hispanic.

<sup>d</sup> High-volume chronic physical condition categories, based on the HCUP Chronic Condition Indicator File (AHRQ, 2014), include endocrine, nutritional, metabolic, immunity disorders; diseases of the circulatory system; diseases of the nervous system and sense organs; diseases of the respiratory system; diseases of the musculoskeletal system; and diseases of the digestive system.

<sup>e</sup> Serious mental illness (SMI) and substance use disorder (SUD) defined as presence of ICD-9 codes in any setting during the study measurement period, as specified in Exhibit G (KDMS, 2015).

<sup>f</sup> Restricted to those prior to the 1<sup>st</sup> NTDV for members with this outcome.

<sup>g</sup> Members with any outpatient dental visit(s) for restorative care had at least one visit with one or more Current Dental Terminology (CDT) codes for treatment, i.e., services not limited to preventive/diagnostic or pain/palliative care services. Members with pain/palliative care without restorative care had no visits for restorative care (treatment), but had at least one visit with the CDT code for pain/palliative care. Members with any preventive/diagnostic care, only, had no visits for restorative care and no visits for pain/palliative care, but did have at least one visit for preventive or diagnostic care.



**Table 13** presents multiple logistic regression findings for the relationships between the outcome of any NTDV and SMI and SUD diagnostic combinations, independent of other demographic, clinical and access-related factors. Statistically significant findings are the following:

- Compared to members with neither a diagnosis of schizophrenia nor SUD, members with both a diagnosis of schizophrenia and SUD had 63% greater odds for any NTDV (AOR = 1.63; 95% CI = 1.28, 2.09); and members with a diagnosis of SUD, only, had 10% greater odds for any NTDV (AOR = 1.10; 95% CI = 1.02, 1.19).
- Compared to members with neither a diagnosis of bipolar disorder nor SUD, members with both a diagnosis of bipolar disorder and SUD had 61% greater odds for any NTDV (AOR = 1.61; 95% CI = 1.18, 2.20); and members with a diagnosis of SUD, only, had 12% greater odds for any NTDV (AOR = 1.12; 95% CI = 1.04, 1.21).
- Compared to members with neither a diagnosis of depressive disorder nor SUD, members with both a diagnosis of depressive disorder and SUD had 26% greater odds for any NTDV (AOR = 1.26; 95% CI = 1.13, 1.41).
- Compared to members with neither a diagnosis of post-traumatic stress disorder (PTSD) nor SUD, members with a diagnosis of PTSD, only, had 18% greater odds for any NTDV (AOR = 1.18; 95% CI = 1.04, 1.36) and members with a diagnosis of SUD, only, had 14% greater odds for any NTDV (AOR = 1.14; 95% CI = 1.05, 1.23). The association between having both a diagnosis of PTSD and SUD was the same as that of dual diagnosis for depression and SUD (AOR = 1.26); however, the observed association for PTSD was not statistically significant (i.e., the 95% CI contained the null value of “1”: 95% CI = 0.97, 1.63).

**Table 13: NTDV Outcome: Multiple Logistic Regression Analysis of Behavioral Health and Substance Use Disorder Diagnoses**

Diagnostic Combinations <sup>a</sup>	AOR <sup>b</sup>	95% CI
<b>Schizophrenia, substance use disorder (SUD)</b>		
Neither <sup>c</sup>	1.00 (referent)	-
Schizophrenia, only <sup>c</sup>	0.86	(0.73, 1.01)
SUD, only <sup>c</sup>	1.10	(1.02, 1.19)
Both	1.63	(1.28, 2.09)
<b>Bipolar disorders, SUD</b>		
Neither <sup>c</sup>	1.00 (referent)	-
Bipolar disorders, only <sup>c</sup>	1.08	(0.90, 1.31)
SUD, only <sup>c</sup>	1.12	(1.04, 1.21)
Both	1.61	(1.18, 2.20)
<b>Depressive disorders, SUD</b>		
Neither <sup>c</sup>	1.00 (referent)	-
Depressive disorders, only <sup>c</sup>	0.95	(0.90, 1.01)
SUD, only <sup>c</sup>	1.03	(0.93, 1.13)
Both	1.26	(1.13, 1.41)
<b>Trauma related disorders (e.g., PTSD), SUD</b>		
Neither <sup>c</sup>	1.00 (referent)	-
Trauma related disorders, only <sup>c</sup>	1.18	(1.04, 1.36)
SUD, only <sup>c</sup>	1.14	(1.05, 1.23)
Both	1.26	(0.97, 1.63)

<sup>a</sup> SMI and SUD diagnostic categories defined as presence of ICD-9 codes in any setting during the study measurement period, per ICD-9 codes specified in Exhibit G (KDMS, 2015).

<sup>b</sup> Multiple logistic regression results for the relationship between the outcome of having one or more NTDVs and diagnostic combinations. Each diagnostic combination was statistically adjusted for the influence of demographic, clinical and access-related factors on the outcome in order to facilitate an interpretation of an independent association between each diagnostic combination (relative to its referent group) and the outcome of having one or more NTDVs (i.e., AOR). There were 6,536 members with the outcome and 285,896 members without the outcome.

<sup>c</sup> Members in subsets designated as “neither” or with “only” the behavioral diagnostic category or with “only” the SUD may have additional behavioral health diagnoses other than those indicated for that particular BH diagnostic combination. PTSD: post-traumatic stress disorder.

## Multiple NTDV: Demographic, Clinical and Access-Related Factors

Among the subset of 6,536 Kentucky BH MMC members with any NTDVs, 1,237 (18.93%) had multiple NTDVs (MNTDVs; **Table 14**). Demographic factors showed statistically significant differences in proportions for MNTDV rates. The MNTDV rate among males was 20.38%, and among females was 17.91%. Members aged 18–27 years had the highest MNTDV rate (20.36%). Members residing in non-Appalachian, urban counties had the highest MNTDV rate (19.74%), followed by members residing in Appalachian counties (18.82%) and in rural counties (16.80%).

While clinical factors did not show statistically significant differences in proportions, access-related factors showed statistically significant differences in proportions for MNTDV rates. Passport Health Plan had the lowest rate of MNTDVs (15.96%) and Humana-CareSource had the highest MNTDV rate (22.63%). The highest MNTDV rate was among members with an outpatient dental visit for pain/palliative care without a restorative care visit prior to the first NTDV (20.48%), followed by members without any outpatient dental visits prior to the first NTDV (20.03%); and the lowest MNTDV rate was among members with an outpatient dental visit for restorative care prior to the first NTDV (16.38%), followed by members with outpatient dental visits for preventive/diagnostic services prior to the first NTDV (16.42%). There were no statistically significant differences in proportions observed among the subgroups of members with visits to PCPs and BH providers for the MNTDV outcome.

**Table 14: MNTDV Frequencies and Rates – Demographic, Clinical and Access-Related Factors**

Category	NTDV # (Population Proportion)	MNTDV # (MNTDV Rate Among NTDV)
Total	6,536 (100%)	1,237 (18.93%)
<b>Demographic factors:</b>		
<b>Race<sup>a</sup></b>		
White	3,410 (52.17%)	646 (18.94%)
Black	345 (5.28%)	55 (15.94%)
Other – specified <sup>b</sup>	10 (0.15%)	1 (10.00%)
Other – not specified	901 (13.79%)	172 (19.09%)
Not reported	1,870 (28.61%)	363 (19.41%)
<b>Sex<sup>a</sup></b>		
Female	3,852 (58.94%)	690 (17.91%)
Male	2,684 (41.06%)	547 (20.38%)
<b>Age group<sup>a</sup></b>		
18–27 years	2,048 (31.33%)	417 (20.36%)
28–37 years	2,477 (37.90%)	497 (20.06%)
38–47 years	1,241 (18.99%)	222 (17.89%)
48–57 years	651 (9.96%)	85 (13.06%)
58+	119 (1.82%)	16 (13.45%)
<b>Geographic area of residence</b>		
Appalachian county	2,211 (33.83%)	416 (18.82%)
Non-Appalachian county – rural	1,119 (17.12%)	188 (16.80%)
Non-Appalachian county – urban	3,206 (49.05%)	633 (19.74%)
<b>Clinical factors:</b>		
<b>Physical health – members with high-volume chronic physical conditions<sup>c</sup></b>		
0 conditions	1,749 (26.76%)	294 (16.81%)
1 condition	1,488 (22.77%)	290 (19.49%)
2 conditions	1,128 (17.26%)	217 (19.24%)
3–4 conditions	1,505 (23.03%)	296 (19.67%)
5–6 conditions	666 (10.19%)	140 (21.02%)
<b>Behavioral health – serious mental illness (SMI) and/or substance use disorder (SUD)<sup>d</sup></b>		
Neither	3,824 (58.51%)	723 (18.91%)



Category	NTDV # (Population Proportion)	MNTDV # (MNTDV Rate Among NTDV)
SMI, only	1,847 (28.26%)	351 (19.00%)
SUD, only	456 (6.98%)	80 (17.54%)
Both SMI and SUD	409 (6.26%)	83 (20.29%)
<b>Access-related factors:</b>		
MCO <sup>a</sup>		
Passport Health Plan	1,178 (18.02%)	188 (15.96%)
WellCare of Kentucky	2,576 (39.41%)	497 (19.29%)
Aetna Better Health of Kentucky	1,571 (24.04%)	287 (18.27%)
Humana-CareSource	685 (10.48%)	155 (22.63%)
Anthem BCBS Medicaid	526 (8.05%)	110 (20.91%)
Any outpatient dental visits <sup>a,e</sup>		
Restorative care <sup>f</sup>	1,343 (20.55%)	220 (16.38%)
Pain/Palliative care without restorative care, only <sup>f</sup>	210 (3.21%)	43 (20.48%)
Preventive/Diagnostic care, only <sup>f</sup>	670 (10.25%)	110 (16.42%)
None	4,313 (65.99%)	864 (20.03%)
Any visits to primary care providers (PCPs) and/or behavioral health (BH) providers		
Both PCP and BH providers	3,927 (60.08%)	738 (18.79%)
PCP visits, only	997 (15.25%)	204 (20.46%)
BH provider visits, only	169 (2.59%)	25 (14.79%)
Neither	1,443 (22.08%)	270 (18.71%)

<sup>a</sup> Shows statistically significant difference in proportions using *chi*-squared test,  $P < 0.05$ .

<sup>b</sup> "Other – specified" includes American Indian or Alaskan Native, Asian or Pacific Islander, Native Hawaiian and Hispanic.

<sup>c</sup> High-volume chronic physical condition categories, based on the HCUP Chronic Condition Indicator File (AHRQ, 2014), include endocrine, nutritional, metabolic, immunity disorders; diseases of the circulatory system; diseases of the nervous system and sense organs; diseases of the respiratory system; diseases of the musculoskeletal system; and diseases of the digestive system.

<sup>d</sup> Serious mental illness (SMI) and substance use disorder (SUD) defined as presence of ICD-9 codes in any setting during the study measurement period, as specified in Exhibit G (KDMS, 2015).

<sup>e</sup> Restricted to those prior to the 1<sup>st</sup> nontraumatic dental ED visit (NTDV) for members with this outcome.

<sup>f</sup> Members with any outpatient dental visit(s) for restorative care had at least one visit with one or more Current Dental Terminology (CDT) codes for treatment, i.e., services not limited to preventive/diagnostic or pain/palliative care services. Members with pain/palliative care without restorative care had no visits for restorative care (treatment), but had at least one visit with the CDT code for pain/palliative care. Members with any preventive/diagnostic care, only, had no visits for restorative care and no visits for pain/palliative care, but did have at least one visit for preventive or diagnostic care.

MNTDV: multiple NTDV; MCO: managed care organization; BCBS: Blue Cross Blue Shield.

## Risk Factors for MNTDV

**Table 15** presents multiple logistic regression findings for the relationships between the outcome of MNTDV and demographic, clinical and access-related factors for the Kentucky MMC BH subpopulation with any NTDV. Among the subset of members with any NTDV, demographic factors with statistically significant associations with MNTDV, independent of other demographic, clinical and access-related factors, were the following:

- Compared to females, males had 23% greater odds for MNTDV.
- Compared to members aged 58 years and older, members aged 18–27 had more than twice the odds for MNTDV (AOR = 2.14; 95% CI = 1.23, 3.71), and members aged 28–37 had 96% greater odds (AOR = 1.96; 95% CI = 1.13, 3.38).
- Compared to members residing in non-Appalachian urban areas, members residing in non-Appalachian rural areas had 21% lower odds for MNTDV (AOR = 0.79; 95% CI = 0.66, 0.95).

Among the subset of members with any NTDV, clinical factors with statistically significant associations with MNTDV, independent of other demographic, clinical and access-related factors (**Table 15**), were the following:

- Compared to members with none of the high-volume chronic physical health conditions, members with 5-6 chronic physical conditions had 83% greater odds for MNTDV (AOR = 1.83; 95% CI = 1.40, 2.38), with a trend of increasing MNTDV risk as the number of chronic physical health conditions increased. Of note, the AOR comparing the odds for MNTDV among members with 5-6 chronic physical conditions to the odds for MNTDV among members with none of the high-volume chronic physical health conditions was significantly greater than the AOR for NTDV, as evidenced by non-overlapping 95% CIs (AOR for “NTDV” = 1.15; 95% CI = 1.03, 1.27).

Among the subset of members with any NTDV, access-related factors with statistically significant associations with MNTDV, independent of other demographic, clinical and access-related factors (**Table 15**), were the following:

- Compared to Passport Health Plan members, Humana-CareSource members had 54% greater odds for MNTDV (AOR = 1.54; 95% CI = 1.21, 1.96); Anthem BCBS Medicaid members had 39% greater odds for MNTDV (AOR = 1.39; 95% CI = 1.06, 1.81); and WellCare of Kentucky members had 29% greater odds for MNTDV (AOR = 1.29; 95% CI = 1.07, 1.57).
- Compared to members with outpatient dental visits for restorative care prior to the first NTDV, members without any outpatient dental visits prior to the first NTDV showed 33% greater odds for MNTDV (AOR = 1.33; 95% CI = 1.13, 1.57).

**Table 15: MNTDV Outcome: Multiple Logistic Regression Analysis of Risk Factors**

Categories <sup>a</sup>	AOR <sup>b</sup>	95% CI
<b>Demographic factors:</b>		
Race		
White	1.00 (referent)	-
Black	0.85	0.62, 1.15
Other – specified <sup>c</sup>	0.47	0.06, 3.79
Other – not specified	0.99	0.82, 1.20
Not reported	1.01	0.87, 1.17
Sex		
Female	1.00 (referent)	-
Male	1.23	1.08, 1.40
Age group		
18–27 years	2.14	1.23, 3.71
28–37 years	1.96	1.13, 3.38
38–47 years	1.51	0.87, 2.62
48–57 years	0.97	0.54, 1.72
58+ years	1.00 (referent)	-
Geographic area of residence		
Appalachian county	0.86	0.75, 1.00
Non-Appalachian county – rural	0.79	0.66, 0.95

Categories <sup>a</sup>	AOR <sup>b</sup>	95% CI
Non-Appalachian county – urban	1.00 (referent)	-
<b>Clinical factors:</b>		
Physical health – members with high-volume chronic physical conditions <sup>d</sup>		
0 conditions	1.00 (referent)	-
1 condition	1.26	1.05, 1.52
2 conditions	1.29	1.05, 1.59
3–4 conditions	1.48	1.20, 1.82
5–6 conditions	1.83	1.40, 2.38
Behavioral health – serious mental illness (SMI) and/or substance use disorder (SUD) <sup>e</sup>		
Neither	1.00 (referent)	-
SMI, only	0.98	0.84, 1.15
SUD, only	0.88	0.68, 1.14
Both SMI and SUD	1.00	0.76, 1.31
<b>Access-related factors:</b>		
MCO		
Passport Health Plan	1.00 (referent)	-
WellCare of Kentucky	1.29	1.07, 1.57
Aetna Better Health of Kentucky	1.21	0.98, 1.48
Humana-CareSource	1.54	1.21, 1.96
Anthem BCBS Medicaid	1.39	1.06, 1.81
Any outpatient dental visits <sup>f</sup>		
Restorative care <sup>g</sup>	1.00 (referent)	-
Pain/Palliative care without restorative care, only <sup>g</sup>	1.38	0.96, 2.00
Preventive/Diagnostic care, only <sup>g</sup>	1.00	0.78, 1.29
None	1.33	1.13, 1.57
Any visits to primary care providers (PCPs) and/or behavioral health (BH) providers		
Both PCP and BH providers	1.00 (referent)	-
PCP visits, only	1.12	0.93, 1.35
BH provider visits, only	0.79	0.50, 1.23
Neither	0.99	0.83, 1.18

<sup>a</sup> Categories of possible risk factors evaluated in multiple logistic regression analysis.

<sup>b</sup> Multiple logistic regression results for the relationship between the outcome of having MNTDVs and risk factors. Each risk factor was statistically adjusted for the influence of the other risk factors on the outcome in order to facilitate an interpretation of an independent association between each risk factor (relative to its referent group) and the outcome of having MNTDVs (i.e., AOR). There were 1,237 members with the outcome, i.e., MNTDVs, and 5,299 members without the outcome, i.e., NTDV, but not MNTDV.

<sup>c</sup> “Other – specified” includes American Indian or Alaskan Native, Asian or Pacific Islander, Native Hawaiian, and Hispanic.

<sup>d</sup> Statistically significant trend for greater odds for multiple visits with increasing number of chronic physical health conditions. High-volume chronic physical condition categories, based on the HCUP Chronic Condition Indicator File (AHRQ, 2014), include endocrine, nutritional, metabolic, immunity disorders; diseases of the circulatory system; diseases of the nervous system and sense organs; diseases of the respiratory system; diseases of the musculoskeletal system; and diseases of the digestive system.

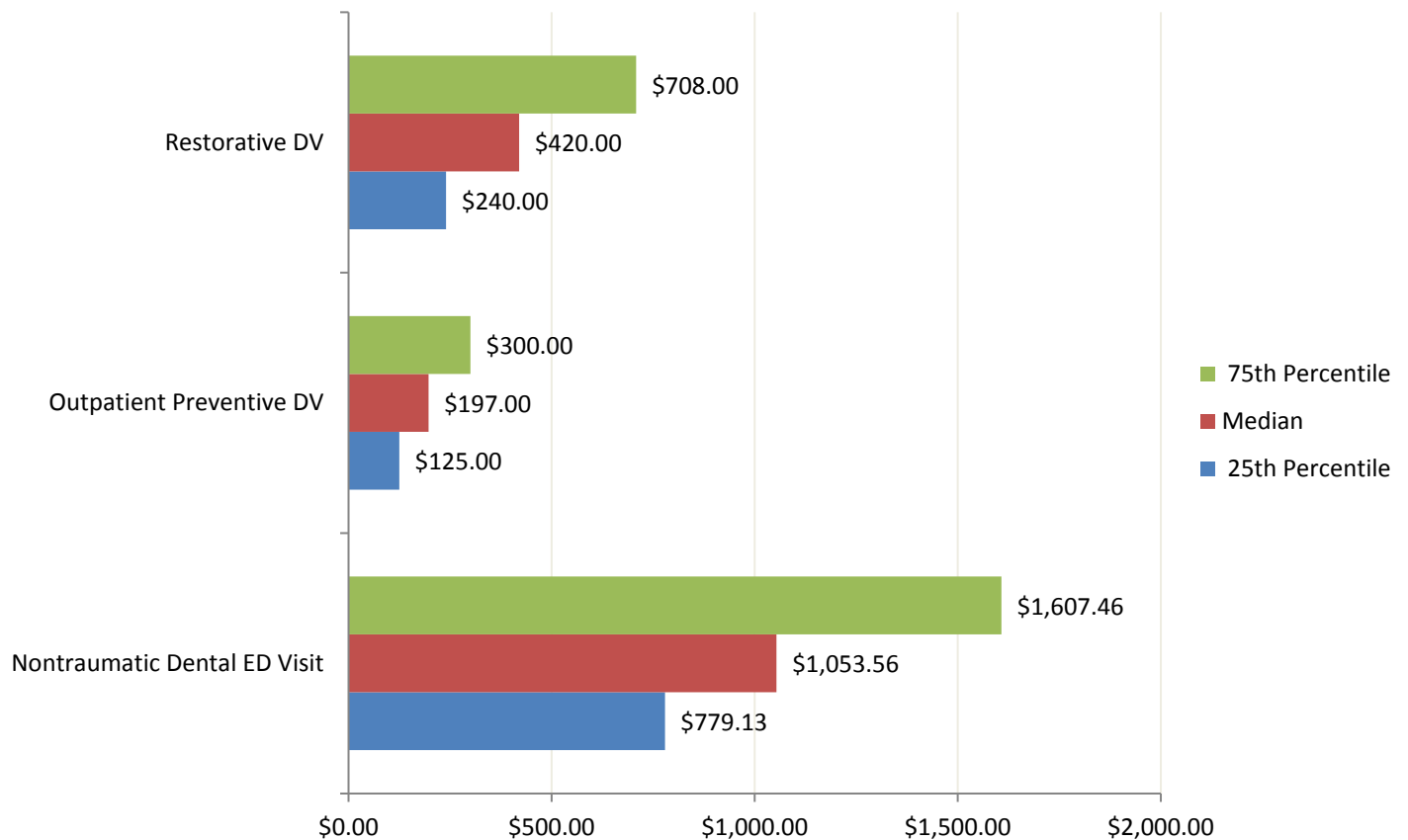
<sup>e</sup> Serious mental illness (SMI) and substance use disorder (SUD) defined as presence of ICD-9 codes in any setting during the study measurement period, as specified in Exhibit G (KDMS, 2015).

<sup>f</sup> Restricted to those prior to the 1<sup>st</sup> NTDV.

<sup>g</sup> Members with any outpatient dental visit(s) for restorative care had at least one visit with one or more Current Dental Terminology (CDT) codes for treatment, i.e., services not limited to preventive/diagnostic or pain/palliative care services. Members with pain/palliative care without restorative care had no visits for restorative care (treatment), but had at least one visit with the CDT code for pain/palliative care. Members with any preventive/diagnostic care, only, had no visits for restorative care and no visits for pain/palliative care, but did have at least one visit for preventive or diagnostic care.

## Comparison of Estimated Costs of Dental Visits

**Figure 1** presents comparative costs estimated by the median of the total billed amount for each encounter type, i.e., NTDV, outpatient restorative dental visit (resin filling for one or more cavities), and preventive outpatient dental visit. The median cost of an NTDV was \$1,053.56; this is more than five times greater than the median cost of an outpatient preventive dental visit (\$197.00), and two-and-a-half times greater than the cost of an outpatient restorative dental visit (\$420.00).



**Figure 1: Comparison of Estimated Costs of Dental Visits.** The 25<sup>th</sup> percentile (blue), median (red) and 75<sup>th</sup> percentile (green) for cost estimates of restorative dental visit (DV), outpatient preventive dental visit, and nontraumatic dental emergency department (ED) visit are shown.

## Discussion

Among the Kentucky MMC BH population, young adults, males and urban dwellers had greater odds for unmet dental need, as indicated by NTDV outcomes. These demographic findings were consistent with previous studies conducted among general populations in other states, such as in Iowa and Oregon (Darling et al., 2015; Sun et al., 2015). A notable difference, however, is that the multiple NTDV rate was almost 19% among the Kentucky MMC BH population, whereas it was only 12% in a general population study (Darling et al., 2015). This highlights the magnitude of unmet dental need among the Kentucky MMC BH population. Of note, a novel study finding is that Kentucky MMC members with dual diagnoses of serious mental illness and substance use disorder were particularly vulnerable to unmet dental need.

Among the subset of ED utilizers, the current study observed a trend for increased odds for recurring NTDVs as the number of chronic physical health conditions increased, and this association was also observed in a general population by Darling et al. (2015), who interpreted this finding as indicative of the interconnectedness of oral and systemic health. DeLia et al. (2015) found that the strongest predictor of ED use for oral conditions was the level of ED use for other conditions, suggested that the ED may be perceived as a usual source of care among people who utilize the ED for NTDV and other conditions, and recommended enhanced coordination for outpatient receipt of medical and dental treatment. The latter interpretation might better explain the trend in the current study, because a significant trend was observed only for the outcome of multiple NTDV, but not “any NTDV,” meaning one or more NTDVs. Moreover, the odds ratio comparing members with 5-6 chronic physical conditions to members without chronic conditions was significantly greater for multiple NTDVs (AOR = 1.83; 95% CI = 1.40, 2.38) compared to the odds ratio for “any NTDV” (AOR = 1.15; 95% CI = 1.03, 1.27), as indicated by the non-overlapping confidence intervals. Of note, another novel finding of the current study was that, compared to members with visits to both PCPs and BH providers, members with neither type of visit had increased odds for NTDV; thus supporting the benefits of care coordination by both MCO care coordinators and physical health providers who refer members to dental providers. Both lack of patient awareness and lack of health system recognition regarding the importance of oral health have been suggested as underlying causes of unmet dental need and its adverse consequences (Feldman, 2014). The variability among MCO membership regarding the odds for NTDV is an important and novel finding that lends support to opportunities for quality improvement via health plan interventions, such as those to improve access, care coordination and member education.

Novel findings also shed light on the potential for health system and provider interventions to improve dental care access and quality. Members who had an outpatient dental visit for pain/palliative care, but who did not receive treatment, had more than three times greater odds for a subsequent NTDV event compared to the members who received outpatient dental treatment. This association between lack of treatment (i.e., lack of restorative care visit) and subsequent NTDV was the second strongest association detected in this analysis (the strongest being the association between young age, a known risk factor for NTDV, and subsequent NTDV). This is an important new insight, because it highlights the consequences of barriers to dental treatment.

Lack of any outpatient dental visit was a risk factor for both “any NTDV” and MNTDV outcomes. Moreover, the vast majority of Kentucky MMC BH members visited the dentist for pain after the first NTDV event. Thus, not only is unmet need indicated by the NTDV event itself, but this gap in care also suggests that the underlying dental problem is not resolved by the type of care that an ED provides. Similar to other studies (Darling et al., 2015; DeLia et al., 2015; Sun et al., 2015; Trikhacheva et al., 2015), the predominant ED dental diagnosis in this study was nonspecific, and thus, indicative of inadequate resources (e.g., dental x-ray machines; Feldman, 2014), time, and expertise in the ED to diagnose and treat dental problems. Further, Sun et al. (2015) conducted interviews with NTDV utilizers, and found that subsequent visits to the dentists did not solve dental problems due to inability to pay for treatment such as root canals, crowns and partial dentures; consequently, these patients turned to EDs for oral care. Of note, root canal therapy, crowns and partial dentures are non-covered services for Medicaid enrollees (KDMS, 2016a). Moreover, next to nonspecific dental diagnosis, ED visits for diseases of pulp (which contains the root canal) and periapical tissues comprised the largest category of NTDV for the Kentucky BH MMC population.

Barriers to accessing outpatient dental care and, consequently, gaps in oral health care, crossed geographic boundaries. Among the entire Kentucky MMC BH population, rural residents had the highest rate for lacking any outpatient dental visits, Appalachian residents had the highest rate for oral pain care visits without restorative dental care, and urban residents had the highest rate for preventive dental visits without either restorative or pain care. Rural residency was a

risk factor for lacking any outpatient dental visit, yet urban dwellers showed the greatest odds for NTDV, as well as increased odds for MNTDV. Urban residents also comprised the greatest proportion of members with an NTDV who received the nonspecific ED dental diagnosis, and had the highest NTDV rate attributable to the nonspecific dental diagnosis. In addition, among NTDV utilizers, urban counties had the highest rates for receipt of restorative outpatient dental visits only after the NTDV.

Of note, the three counties with the highest NTDV rates were all urban and located in Region 6, and so, may represent an initial target area for MCO barrier analysis pertinent to urban residents. Diverting ED dental visits has been shown to reduce ED visits for dental conditions by 52%, with ED re-visits for dental conditions reduced by more than 66% (McCormick et al., 2013). McCormick and colleagues (2013) implemented a pilot program at an urban academic medical center that triaged patients who presented to the ED and diverted, that is, referred, non-emergent patients to the urgent dental clinic where they were seen by the oral and maxillofacial surgery resident. Opportunities to implement ED dental visit diversion programs, with potential savings of millions of dollars annually (Nasseh et al., 2014), merit exploration particularly in Region 6, which includes the counties with the highest NTDV rates, as well as nearby academic medical centers in Louisville and Lexington with residency programs in oral and maxillofacial surgery as well as dental clinics.

Also among NTDV utilizers, the transitional Appalachian county, Boyd, had the highest rate of members without any outpatient dental visit, and the two distressed Appalachian counties, Harlan and Clay, had the highest rates of members with an outpatient dental visit for pain/palliative care without any restorative outpatient care. Moreover, rural residence was a risk factor for lack of any outpatient dental visits. Thus, although odds for NTDV were higher among urban residents, barriers to access are not restricted to any one county or geographic type. The American Dental Association (ADA) identified several “dental safety net” solutions that have been implemented at the local level to treat the causes instead of the symptoms of dental pain, to reduce preventable dental ED visits, to decrease overuse of pain medications for dental pain, and to improve access to dentists (ADA, 2014). Specific examples of success stories include an ED program that provides patients who present with dental pain with one prescription for pain medication and antibiotics and a referral to a local clinic or oral surgeon, and a pilot program to refer patients with dental pain from the ER to an urgent dental care clinic located in the hospital (ADA, 2014).

Sun and colleagues (2015) concluded that increasing the dental workforce is neither practical nor effective in addressing the problems underlying NTDVs. Instead, they recommend a two-part strategy based on recognition of modifiable determinants of ED dental visits. First, the finding that young adulthood is a risk factor for NTDV suggests that most NTDV-related problems begin during adolescence, and thus, interventions to target Medicaid-enrolled adolescents are merited (Sun et al., 2015). Specific suggestions include the following: case managers could work with families and dental offices to facilitate appropriate disease prevention and management; school nurses or hygienists could screen and refer adolescents to dental homes for comprehensive oral health care (ADA, 2007); schools could eliminate sugar-sweetened beverages from vending machines; and home-based interventions could emphasize improving oral hygiene by twice-daily brushing of teeth with fluoride toothpaste (Sun et al., 2015). Second, Sun and colleagues (2015) also advise consideration of addressing the dental care needs of patients with existing disease with low-cost, definitive treatment options such as removable dentures provided by specially trained denturists (Nash, 2012), interim therapeutic restorations more typically utilized by pediatric dentists (Milgrom, 2011), and oral health management in non-dental office settings such as virtual dental homes (Glassman et al., 2013).

The gaps identified in the Access and Availability Dental Survey conducted by IPRO on behalf of Kentucky Department for Medicaid Services (KDMS; KDMS, 2016b) point to specific opportunities for improvement among the Kentucky MMC population. Specifically, the survey found variability among MCOs regarding compliance with timeliness standards for scheduling of routine appointments within 21 days and urgent care appointments within 48 hours, with overall compliance rates of only 35.2% and 31.6%, respectively. The most common reasons for having no appointment made for routine and urgent calls were that the provider was not a plan participant, the provider practice was restricted to specialty care, the provider was not accepting new patients and the provider was not at the practice site. These findings indicate that MCOs should address each of these non-compliance drivers in order to ensure that an adequate provider network is available and accessible to members.

## Study Limitations and Strengths

*Study limitations* include the potential for residual confounding, i.e., unmeasured factors that may influence the relationship between the possible risk factor and the outcome, as this limitation is inherent to any observational study design. . For example, this study did not examine NTDV by specific hospital ED, and DeLia et al. (2015) observed that many repeat ED utilizers visited three or more hospitals. Therefore, MCO-specific associations with MNTDV should be interpreted with caution, and MCO follow-up to assess multiple hospital ED use for NTDV is merited. In addition, clinical indicators based upon Current Dental Terminology (CDT) and ICD-9 encounter codes, as well as provider specialty encounter documentation, e.g., dental, chronic physical condition and BH diagnoses, PCP and BH provider visits, were not validated with chart review, and hence may be subject to misclassification bias due to coding inaccuracies. Further, although the ICD-9 codes used to define NTDVs were utilized in prior research, it is not possible to discern from ICD-9 codes whether an ED visit was truly preventable. Use of encounter codes also precluded our ability to identify members who might have required treatment in an inpatient or outpatient setting due to a “physical, mental or behavioral condition that would jeopardize the recipient’s health and safety if provided in a dentist’s office” (Kentucky Medicaid State Plan Amendments, 2011). This focused study used the definitions for serious mental illness and substance use disorder provided to MCOs by KDMS (2015); however, the presence of these diagnoses was restricted to the 12-month study period, rather than the previous 24-months specified in Exhibit G to the KDMS memorandum (KDMS, 2015). In addition, the estimated cost analysis was based on amount billed, rather than a true cost analysis. The scope of this focused study did not include the use of opioid analgesics or tobacco. Opioid use merits consideration by KDMS and the MCOs because patients who seek care for oral pain in the ED are typically prescribed opioids for NTDVs (Okunseri et al., 2015). Tobacco use among the Kentucky MMC BH population with NTDVs also merits follow-up, as DeLia et al. (2015) found that tobacco use disorder is the most common comorbid condition among people with NTDVs.

*Study strengths* include using sufficient sample size to detect statistically significant differences in associations between possible risk factors and the NTDV and MNTDV outcomes, and maximizing internal and external validity. Internal validity is the extent to which the study measures what it intends to measure and, in the current study, was maximized by:

- defining the NTDV outcome consistent with scientific research;
- using standardized diagnosis coding specifications for dental, behavioral and chronic physical health conditions; and
- using multivariable logistic regression analysis to statistically control for potential confounders.

External validity is the extent to which findings may be generalized to the population of interest and, in the current study, was maximized by:

- using a sample that is representative of the Kentucky MMC BH subpopulation.

## Conclusion

Unmet dental need is a substantial problem for the Kentucky MMC BH subpopulation, and a driver of costs attributable to NTDVs. Improving access to preventive and treatment-based outpatient dental care holds the potential to reduce unnecessary ED visits and improve the health of this vulnerable subpopulation, as well as generate considerable cost savings. Further, enhanced care coordination that facilitates access to PCPs, BH providers, as well as dentists, is merited. MCOs should consider the risk factors identified in this study for targeting care management interventions, as well as investigate patterns of multiple hospital ED use, opioid prescription and tobacco use disorder among the Kentucky MMC BH subpopulation.

## Recommendations

Kentucky Medicaid MCOs can address the problems and risk factors identified in this focused study by identifying and sharing current gaps and best practices, as well as collaborating with providers for quality improvements by drawing on the following specific recommendations:

- Target care coordination/case management to susceptible subpopulation as indicated by risk factors identified in this report.
- Enhance care management programs for improved outreach and engagement of the BH population for integration of physical health, mental health and oral health care.
- Work with PCPs, BH providers and dentists to improve integration of physical, behavioral and oral health care services.



- Develop partnerships with academic medical centers for implementation of ED dental diversion programs in urban areas.
- Evaluate dental networks in rural and Appalachian counties, and undertake initiatives to improve access and availability of dental providers.
- Address each of the non-compliance drivers identified in the Access and Availability Dental Survey (KDMS, 2016b) in order to ensure that an adequate provider network is available and accessible to members.
- Conduct performance improvement projects (PIPs) to improve the integration of and access to physical, behavioral and oral health care services, with targeted interventions to improve oral health for adolescents and young adults.
- Survey members with MNTDVs to identify barriers to accessing and utilizing outpatient dental care.
- Educate members about the importance of oral health to overall health and well-being, as well as appropriate sources of care and the availability of covered services, and engage providers to deliver preventive and restorative dental care.
- Conduct MCO- and county-specific analysis of NTDV, outpatient preventive and outpatient treatment dental visits, in order to highlight geographic areas of need, such as counties with shortages of dentists willing to provide preventive and treatment dental services.
- Conduct MCO-specific analysis of NTDV to also address patterns of multiple hospital usage, opioid prescription and tobacco use disorder, develop hospital-community partnerships to address these issues, and monitor NTDVs to identify candidates for Lock-In Programs.

KDMS can provide guidance to MCOs in order to address the issues identified in this focused study and develop comprehensive strategies for quality improvement, care coordination, integration and continuity. Specific recommendations for KDMS include the following:

- Initiate a statewide PIP that aims to integrate oral health care with primary health care for adult MMC enrollees with BH conditions, including the high-risk subpopulation of adults with SMI and SUD.
- Collaborate with MCOs to implement solutions recommended by the ADA, such as ED dental diversion programs in urban areas with access to urgent care dental clinics.
- Collaborate with the Centers for Medicare and Medicaid Services (CMS) to extend the CMS Oral Health Collaborative to address the adult BH subpopulation.
- Collaborate with MCOs and CMS to enhance the Oral Health Collaborative PIP by adding aims, objectives and interventions to improve adolescent oral health.
- Findings from this focused study reinforce the importance of IPRO's recommendation in the Access and Availability Dental Survey (KDMS, 2016b) that KDMS work with the MCOs to increase dental contact and appointment rates in order to improve access to appropriate dental care.



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## Appendix A: Outpatient Dental Visit Timing by Visit Type – Ten Counties with the Highest NTDV Rates

Table A1: Timing of Outpatient Dental Visits by Visit Type for Members with NTDV(s) – Ten Counties with the Highest NTDV Rates

County	All NTDV ED Utilizers <sup>a</sup> # (Col %)	Subset: No ODVs # (Row %)	Subset (n = 249): With Pain/Palliative Care ODV Without Restorative Care ODV			Subset (n = 691): With Preventive/Diagnostic ODV Without Restorative Care ODV Without Pain/Palliative Care ODV			Subset (n = 3,489): With Restorative Care ODV		
			Before 1 <sup>st</sup> ED Visit, Only <sup>b</sup> # (%)	After 1 <sup>st</sup> ED Visit, Only <sup>b</sup> # (%)	Before & After 1 <sup>st</sup> ED Visit <sup>b</sup> # (%)	Before 1 <sup>st</sup> ED Visit, Only <sup>b</sup> # (%)	After 1 <sup>st</sup> ED Visit, Only <sup>b</sup> # (%)	Before & After 1 <sup>st</sup> ED Visit <sup>b</sup> # (%)	Before 1 <sup>st</sup> ED Visit, Only <sup>b</sup> # (%)	After 1 <sup>st</sup> ED Visit, Only <sup>b</sup> # (%)	Before & After 1 <sup>st</sup> ED Visit <sup>b</sup> # (%)
State total	6,536 (100%)	2,107 (32.24%)	89/249 (35.74%)	145/249 (58.23%)	15/249 (6.02%)	209/691 (30.25%)	415/691 (60.06%)	67/691 (9.70%)	702/3,489 (20.12%)	2,146/3,489 (61.51%)	641/3,489 (18.37%)
Kenton (urban)	596 (9.12%)	252 (42.28%)	3/8 (37.50%)	5/8 (62.50%)	0/8 (0.00%)	23/88 (26.14%)	56/88 (63.64%)	9/88 (10.23%)	44/248 (17.74%)	174/248 (70.16%)	30/248 (12.10%)
Grant (urban)	99 (1.51%)	32 (32.32%)	0/1 (0.00%)	1/1 (100%)	0/1 (0.00%)	5/11 (45.45%)	5/11 (45.45%)	1/11 (9.09%)	11/55 (20.00%)	31/55 (56.36%)	13/55 (23.64%)
Campbell (urban)	216 (3.30%)	79 (36.57%)	0/0 (0.00%)	0/0 (0.00%)	0/0 (0.00%)	6/33 (18.18%)	21/33 (63.64%)	6/33 (18.18%)	19/104 (18.27%)	71/104 (68.27%)	14/104 (13.46%)
Boyd (Appalachian, transitional <sup>c</sup> )	185 (2.83%)	83 (44.86%)	0/0 (0.00%)	0/0 (0.00%)	0/0 (0.00%)	5/19 (26.32%)	12/19 (63.16%)	2/19 (10.53%)	21/83 (25.30%)	48/83 (57.83%)	14/83 (16.87%)
Grayson (rural)	112 (1.71%)	47 (41.96%)	0/6 (0.00%)	6/6 (100%)	0/6 (0.00%)	4/9 (44.44%)	5/9 (55.56%)	0/9 (0.00%)	11/50 (22.00%)	32/50 (64.00%)	7/50 (14.00%)
Jessamine (urban)	142 (2.17%)	40 (28.17%)	3/6 (50.00%)	3/6 (50.00%)	0/6 (0.00%)	8/26 (30.77%)	13/26 (50.00%)	5/26 (19.23%)	12/70 (17.14%)	42/70 (60.00%)	16/70 (22.86%)
Harlan (Appalachian, distressed <sup>d</sup> )	133 (2.03%)	42 (31.58%)	6/19 (31.58%)	10/19 (52.63%)	3/19 (15.79%)	5/7 (71.43%)	2/7 (28.57%)	0/7 (0.00%)	15/65 (23.08%)	37/65 (56.92%)	13/65 (20.00%)
Clay (Appalachian, distressed <sup>d</sup> )	134 (2.05%)	48 (35.82%)	8/14 (57.14%)	6/14 (42.86%)	0/14 (0.00%)	4/11 (36.36%)	6/11 (54.55%)	1/11 (9.09%)	15/61 (24.59%)	31/61 (50.82%)	15/61 (24.59%)
Woodford (urban)	41 (0.63%)	16 (39.02%)	1/2 (50.00%)	1/2 (50.00%)	0/2 (0.00%)	0/2 (0.00%)	1/2 (50.00%)	1/2 (50.00%)	3/21 (14.29%)	14/21 (66.67%)	4/21 (19.05%)
Ohio (rural)	79 (1.21%)	24 (30.38%)	1/1 (100%)	0/1 (0.00%)	0/1 (0.00%)	1/10 (10.00%)	9/10 (90.00%)	0/10 (0.00%)	11/44 (25.00%)	29/44 (65.91%)	4/44 (9.09%)

<sup>a</sup> Includes members with “any NTDV,” meaning one or more NTDVs (n = 6,536 for the entire state).

<sup>b</sup> First nontraumatic dental emergency department visit (NTDV) during the study period, June 1, 2014–May 31, 2015. Member may have had NTDV(s) prior to study period, as well as subsequent NTDV(s).

<sup>c</sup> “Appalachian, transitional” represents counties transitioning between strong and weak economies (ARC, 2016).

<sup>d</sup> “Appalachian, distressed” represents the most economically depressed counties, i.e., rank among the worst 10% of U.S. counties (ARC, 2016).

ED: emergency department; ODV: outpatient dental visit.